



Calhoun: The NPS Institutional Archive

Theses and Dissertations

Thesis Collection

2014-06

py Britain s nuclear deterrent force and th special relationship

Merritt, Emily S.

Monterey, California: Naval Postgraduate School

<http://hdl.handle.net/10945/42685>



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**BRITAIN'S NUCLEAR DETERRENT FORCE AND THE
U.S.-U.K. SPECIAL RELATIONSHIP**

by

Emily S. Merritt

June 2014

Thesis Advisor:
Second Reader:

David Yost
Daniel Moran

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 2014	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE BRITAIN'S NUCLEAR DETERRENT FORCE AND THE U.S.-U.K. SPECIAL RELATIONSHIP			5. FUNDING NUMBERS	
6. AUTHOR(S) Emily S. Merritt				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ____N/A____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release;distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) Britain established in 1940 the first national nuclear weapons program in the world, and this gave Britain credibility in participating in the U.S.-led Manhattan Project during World War II. Despite the interruption in U.S.-U.K. nuclear cooperation in 1946-1958 owing to the McMahon Act, since 1958 the United States and the United Kingdom have worked closely in the nuclear domain. Indeed, since the 1962 Nassau Summit, the United States has sold submarine-launched ballistic missiles (SLBMs) and support systems to the United Kingdom. In 1980 and 1982, London chose to modernize its nuclear deterrent with Trident SLBMs. The British made a similar decision in 2006, and it may be reconfirmed in 2016 with legislation to construct a new fleet of Trident nuclear ballistic missile submarines. Britain has been motivated to remain a nuclear weapons state in order to protect its own national security interests and to contribute to the security of its NATO allies in an unpredictable international security environment.				
14. SUBJECT TERMS Nuclear, deterrence, U.S., U.K., submarines, Polaris, Trident, V-bomber, Britain, United States, United Kingdom, weapons, special relationship, Cold War, SSN, SSBN, ICBM, SLBM, IRBM, ballistic, NATO, Nassau Agreement, McMahon Act, European Union			15. NUMBER OF PAGES 77	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

**BRITAIN'S NUCLEAR DETERRENT FORCE AND THE U.S.-U.K. SPECIAL
RELATIONSHIP**

Emily S. Merritt
Lieutenant, United States Navy
B.A., University of Missouri-Columbia, 2009

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(EUROPE AND EURASIA)**

from the

**NAVAL POSTGRADUATE SCHOOL
June 2014**

Author: Emily S. Merritt

Approved by: David Yost
Thesis Advisor

Daniel Moran
Second Reader

Mohammed Hafez
Chair, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

Britain established in 1940 the first national nuclear weapons program in the world, and this gave Britain credibility in participating in the U.S.-led Manhattan Project during World War II. Despite the interruption in U.S.-U.K. nuclear cooperation in 1946-1958 owing to the McMahon Act, since 1958 the United States and the United Kingdom have worked closely in the nuclear domain. Indeed, since the 1962 Nassau Summit, the United States has sold submarine-launched ballistic missiles (SLBMs) and support systems to the United Kingdom. In 1980 and 1982, London chose to modernize its nuclear deterrent with Trident SLBMs. The British made a similar decision in 2006, and it may be reconfirmed in 2016 with legislation to construct a new fleet of Trident nuclear ballistic missile submarines. Britain has been motivated to remain a nuclear weapons state in order to protect its own national security interests and to contribute to the security of its NATO allies in an unpredictable international security environment.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	BRITAIN'S NUCLEAR DETERRENT FORCE AND THE U.S.-U.K. SPECIAL RELATIONSHIP	1
A.	MAJOR RESEARCH QUESTION.....	1
B.	IMPORTANCE	1
C.	PROBLEMS AND HYPOTHESES.....	2
D.	LITERATURE REVIEW.....	2
E.	METHODS AND SOURCES	14
F.	THESIS OVERVIEW	14
II.	BRITAIN AND THE ATOMIC BOMB: BECOMING A NUCLEAR POWER .	15
III.	PLATFORM WORTHY OF THE ULTIMATE WEAPON: BRITAIN'S JOURNEY TOWARD A CREDIBLE DETERRENT	27
IV.	MATURATION OF DETERRENCE POLICY: BRITAIN'S TRANSITION FROM POLARIS TO TRIDENT	39
V.	INSURANCE: BRITAIN'S RATIONALE FOR NUCLEAR DETERRENCE IN THE TWENTY-FIRST CENTURY	49
	LIST OF REFERENCES.....	59
	INITIAL DISTRIBUTION LIST	63

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF ACRONYMS AND ABBREVIATIONS

AERE	Atomic Energy Research Establishment
ALBM	air-launched ballistic missile
BMD	ballistic missile defense
CASD	continuous at-sea deterrence
CSAR	Chief Superintendent Armaments Research
EU	European Union
HER	High Explosives Research
HMG	Her Majesty's Government
IRBM	intermediate-range ballistic missile
ISIS	International Security Information Service
MAUD	Ministry of Aircraft Uranium Development
MIRV	multiple independently targetable reentry vehicles
MLNF	Multilateral Nuclear Force
NATO	North Atlantic Treaty Organization
RAF	Royal Air Force
RUSI	Royal United Services Institute
SACEUR	Supreme Allied Commander Europe
SLBM	submarine-launched ballistic missile
SSBN	nuclear ballistic missile submarine
TAR	Trident Alternatives Review
UK	United Kingdom
US	United States
USSR	Soviet Union

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

This endeavor was a significant personal challenge and I could not have done it without the amazing support, guidance, and reassurance of my professors, family, and friends.

Professor Yost, thank you for taking me under your wing. I was blown away by your mentorship. You helped me to build my confidence as a graduate student and I so much appreciated the amount of time and attention you dedicated to my thesis. Thank you so much.

Professor Moran, thank you for helping me understand how to write a master's thesis and getting my thesis on its feet. I so much admired your grounded, matter-of-fact, and witty approach to explaining history and I really enjoyed listening to your orations. Thank you for all of your guidance throughout this journey!

To my mom and dad, thank you for being there every step of the way. Your unconditional love and support drives me to strive for the next level of my personal and professional development. My innermost desire is to make you proud. I love you.

To everyone else who has supported me, thank you for your friendship. I am deeply humbled by the amazing people whom I have met throughout the years and I am grateful for our shared memories and look forward to sharing more in the future.

THIS PAGE INTENTIONALLY LEFT BLANK

I. BRITAIN'S NUCLEAR DETERRENT FORCE AND THE U.S.- U.K. SPECIAL RELATIONSHIP

A. MAJOR RESEARCH QUESTION

Since the 1940s, when the United Kingdom began its nuclear weapons endeavor, it has been challenged to determine the role and utility of nuclear weapons in relation to its national strategic and political objectives, including the deterrence of aggression. British policy-making, including thinking about how to utilize nuclear weapons to achieve such goals, has evolved since the manufacture of Britain's first nuclear weapon. This thesis investigates the question, "How can the evolution of British nuclear strategy be explained?" Britain is one of the oldest nuclear powers, and it has been obliged to shape its nuclear weapons strategy across a wide range of strategic environments, against a background of continuous technological change. This thesis examines how British nuclear strategy changed during the Cold War and subsequently. It highlights the most important motives for change, and illustrates the impact of the nuclear thinking on British conduct.

B. IMPORTANCE

Nuclear weapons are capable of inflicting extraordinary destruction, depending on their design, yield, mode of delivery, and other variables. The question of how and under what conditions Britain might use nuclear weapons is, therefore, of great domestic and international importance. An historical analysis of how British nuclear thinking has evolved may shed light on what has influenced the United Kingdom's nuclear strategy and how it might change in the future.

It is also important to understand that new technologies—weapons or otherwise—do not come with attached instructions for their use or insights on the

role they will play in society and politics. Applications and understandings of new technology arise from trial and error, and are always influenced by the surrounding policy environment.

The British journey of nuclear discovery and nuclear thinking illustrates this. Like other nuclear powers, Britain has been required to continuously evaluate its strategic outlook in light of the potential obsolescence or deterioration of its current forces. In particular, the British have been required by their own budget and planning process to justify their nuclear strategy every 20 years or so, as the lifespan of their nuclear submarine fleet nears an end and they must decide whether to build new submarines. This cycle has become one of Britain's recurring points of decision, and this makes a general accounting of Britain's nuclear experience particularly worthwhile.

C. PROBLEMS AND HYPOTHESES

This thesis will examine the evolution of British nuclear thinking and strategy, and it is important to set the parameters of what this thesis will specifically consider. This thesis obviously cannot address every inflection of the British nuclear journey. The inflection points chosen for this thesis are viewed by the author as being the most significant and relevant to nuclear thinking and strategy. In addition, the author does not assume that the British have been influenced by a single factor in revising their nuclear policies; instead, strategic shifts are best understood as resulting from a combination of many factors. However, this thesis will focus on what appear to be the most influential considerations for each inflection point.

D. LITERATURE REVIEW

Britain was the first country to study atomic energy as a matter of national policy for the purpose of developing new weapons.¹ Its nuclear weapons program

¹ Stephen Twigge and Len Scott, *Planning Armageddon: Britain, the United States, and the Command of Western Nuclear Forces, 1945–1964* (Amsterdam: Harwood Academic Publishers, 2000), 18.

began in 1940. In 1941, when scientists confirmed that “the scheme for a uranium bomb is practicable”² and that the bomb should be created, “Churchill and the Chiefs of Staff endorsed the quest for its creation.”³ Ian Clark, an expert on the Anglo-American special relationship, states in his book, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962*, that the fear of German atomic capability and the loss of British stature initially drove Britain’s desire for the atomic bomb.⁴

Margaret Gowing is a considered “the official historian of the British atomic energy programme.”⁵ In her book, *Independence and Deterrence: Britain and Atomic Energy, 1945–1952*, Volume 1, Policy Making, she describes how Britain arrived at the decision to acquire nuclear weapons.⁶ She writes that the Chiefs of Staff said in October 1945 that “British production of atomic weapons should start as soon as possible,” and that the ministers agreed that, “whatever arrangements might be made in the international field, Britain should undertake production of bombs on a large scale for her own defence as soon as possible.”⁷ One of the most identifiable people who opposed British acquisition of nuclear weapons, according to Gowing, was physics professor and Labour party member Patrick Maynard Stuart Blackett, who argued that British atomic bombs would reduce security rather than increase it.⁸ In Blackett’s view, atomic bombs “significantly increased the vulnerability of the United Kingdom” and made Britain “the ideal

² Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007), 7.

³ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 22.

⁴ Ibid.

⁵ John Baylis, “British Global Strategy Paper of 1952,” *Journal of Strategic Studies* 16, no. 2 (1993): 201, <http://dx.doi.org/10.1080/01402399308437514>.

⁶ Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1972*. Vol. 1, *Policy Making* (New York: St. Martin’s Press, 1974).

⁷ Ibid., 164.

⁸ Ibid., 171.

target for atomic attack.”⁹ Margaret Gowing found only one document, written by Professor Blackett in February 1947, that recommended that the British government reconsider its decision to make atomic bombs. Gowing read his paper as a last plea to the government, although it is unclear whether he knew that the government had made its decision to establish an atomic weapons program in January 1947.¹⁰

Gowing argues that Britain’s decision to develop atomic weapons was not necessarily based on a security threat at the time, but rather “a feeling that Britain must possess so climacteric a weapon in order to deter an atomically armed enemy, a feeling that Britain as a great power must acquire all major new weapons, a feeling that atomic weapons were a manifestation of that scientific and technological superiority on which Britain’s strength... must depend.”¹¹ The British also wished to gain influence in Washington and felt that they would be more readily heard if they possessed atomic weapons.¹² Ian Clark and Nicholas Wheeler also argue that the decision to make atomic bombs was not “merely a response to the rejection of continued collaboration by the United States in its 1946 Atomic Energy Act,” also known as the McMahon Act.¹³

The McMahon Act of 1946 served as a catalyst for Britain to develop an independent nuclear weapons program because the British realized that Washington would not facilitate further nuclear collaboration, and Britain did not want to be left behind the technological curve. In January 1947, the Attlee

⁹ Patrick Maynard Stuart Blackett quoted in Stephen Twigge and Len Scott, *Planning Armageddon: Britain, the United States, and the Command of Western Nuclear Forces, 1945–1964* (Amsterdam: Harwood Academic Publishers, 2000), 22.

¹⁰ Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1972. Vol. 1, Policy Making* (New York: St. Martin’s Press, 1974), 183.

¹¹ Ibid., 184.

¹² Ibid., 185.

¹³ Ian Clark and Nicholas J. Wheeler, *The British Origins of Nuclear Strategy, 1945–1955* (Oxford: Clarendon Press, 1989), 44.

government initiated an independent nuclear weapons program.¹⁴ Initially, studies predicted that nuclear bombs would be utilized to attack “industry and population.”¹⁵ Lawrence Freedman reports “that until 1948 there was no official permission to consider the Soviet Union as an ‘enemy.’”¹⁶ Ian Clark and Nicholas Wheeler note that the Soviet Union was consistently perceived as a potential threat post-World War II. The British Chiefs of Staff stated in 1946 that “recent developments make it appear that Russia is our most probable potential enemy, far more dangerous than a revived Germany.”¹⁷ It was not until October 3, 1952 that Britain exhibited its nuclear weapons capability to the world via its first nuclear weapon explosive test.¹⁸

In 1947, nuclear weapons possession was viewed as a sufficient deterrent against Soviet aggression.¹⁹ Lawrence Freedman noted that it was more important for Britain to possess nuclear ability than nuclear strategy; the Chiefs of Staff believed in 1947 that “the knowledge that we possessed weapons of mass destruction and were prepared to use them would be the most effective deterrent to war itself.”²⁰ The British government’s strategy was “not a strategy for fighting a war against the Soviet Union, but rather one for preventing it.”²¹ John Baylis noted that the *Global Strategy Paper* of 1952 marked a change in British nuclear

¹⁴ John Baylis, “The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence,” *Journal of Strategic Studies* 31, no. 3 (2008): 427–8, doi: 10.1080/01402390802024726.

¹⁵ Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 82, <http://dx.doi.org/10.1080/07430178508405190>.

¹⁶ Ibid.

¹⁷ British Chiefs of Staff quoted in Ian Clark and Nicholas J. Wheeler, *The British Origins of Nuclear Strategy, 1945–1955* (Oxford: Clarendon Press, 1989), 58.

¹⁸ A. J. R. Groom, “The British Deterrent,” in *British Defence Policy in a Changing World*, ed. John Baylis (London: Croom Helm, 1977), 126.

¹⁹ Martin S. Navias, “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955–56,” *Journal of Strategic Studies* 11, no. 2 (1988): 204, <http://dx.doi.org/10.1080/01402398808437338>.

²⁰ Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 82–83, <http://dx.doi.org/10.1080/07430178508405190>.

²¹ John Baylis, “British Global Strategy Paper of 1952,” *Journal of Strategic Studies* 16, no. 2 (1993): 206, <http://dx.doi.org/10.1080/01402399308437514>.

thinking regarding the Soviets. In 1950, the Chiefs of Staff had judged that the risk of the Soviet Union attacking Western Europe or the United States was “a strong possibility...in the near future.”²² But in 1952, the Chiefs of Staff no longer held this view; they thought that the nuclear capabilities of the West had grown to the point that the Soviet Union would not dare to risk severe retaliation.²³ In 1985 John Roper wrote that “from the very beginning of British nuclear programmes, the vulnerability of delivery systems to Soviet attack or defence has determined the choice of launcher selected.”²⁴

Britain’s first nuclear weapon delivery platform specifically designed for that purpose was a fleet of aircraft called the V-bombers.²⁵ S. J. Ball analyzes Britain’s V-bomber development and strategy in his book, *The Bomber in British Strategy: Doctrine, Strategy, and Britain’s World Role, 1945–1960*.²⁶ Ball writes that the Royal Air Force believed that the V-bombers could play a big role in the Cold War due to their multidimensional capabilities of conventional and nuclear missions, quick mobilization, range of up to 4,000 miles, and bomb payload of up to 30,000 lbs, with an estimated accuracy of 500 yards.²⁷ The British hoped that the V-bombers would be a symbol and instrument of Britain’s independent nuclear deterrent as a contribution to the Western alliance deterrent and as an independent threat to the Soviet Union, as well as a means to induce American

²² Ibid., 205.

²³ Ibid.

²⁴ John Roper, “The British Nuclear Deterrent and New Developments in Ballistic-Missile Defence,” *The World Today* 41, no. 5 (1985): 92, <http://www.jstor.org/stable/40395732>.

²⁵ The Canberra light bomber aircraft were originally designed for conventional missions. Humphrey Wynn, *The RAF Strategic Nuclear Deterrent Forces: their origins, roles, and deployment 1946–1969: A Documentary History* (London: The Stationery Office, 1994), 123.

²⁶ S. J. Ball, *The Bomber in British Strategy: Doctrine, Strategy, and Britain's World Role, 1945-1960* (Boulder, CO: Westview Press, 1995).

²⁷ Ibid., 111.

cooperation and influence American policy.²⁸ The *1958 Defence White Paper* vowed, “when fully equipped with megaton weapons the British bomber force will in itself constitute a formidable deterrent.”²⁹

Martin S. Navias, in his article “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955-56,” describes the British V-bomber strategy during the development of the force. Lord Selwyn Lloyd, Minister of Defense in 1955, “told the Defense Committee that the first objective of the British medium bomber force was the destruction of Soviet air bases from which attacks on Britain could be launched.”³⁰ Secondly, the V-bombers would be used to slow down any effort by the Soviet ground forces to carry out an offensive, and lastly, they would conduct strikes on Soviet nuclear assets and cities.³¹ Navias also remarks that the Royal Air Force (RAF) estimated that only half of the medium bombers would reach their targets, a judgment that calls into question the RAF’s relentless push for the V-bombers as a nuclear deterrent platform. The RAF wanted the V-bombers to promote its role and power. Stephen Twigge and Len Scott point out that intelligence deficiencies regarding “navigational aids and accurate maps of the USSR made precision bombing virtually impossible.”³²

Martin S. Navias argues that Britain did not necessarily have the goal of obtaining an independent deterrent prior to 1957.³³ He writes that “the confidence manifested on the declaratory level about the growing importance of the nuclear deterrent was not matched by unanimity about the procurement and

²⁸ Ibid., 143–144.

²⁹ *1958 Defence White Paper* quoted in Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 85, <http://dx.doi.org/10.1080/07430178508405190>.

³⁰ Martin S. Navias, “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955–56,” *Journal of Strategic Studies* 11, no. 2 (1988): 207, <http://dx.doi.org/10.1080/01402398808437338>.

³¹ Ibid.

³² Stephen Twigge and Len Scott, *Planning Armageddon: Britain, the United States, and the Command of Western Nuclear Forces, 1945–1964* (Amsterdam: Harwood Academic Publishers, 2000), 23.

³³ Martin S. Navias, “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955-56,” *Journal of Strategic Studies* 11, no. 2 (1988): 203, <http://dx.doi.org/10.1080/01402398808437338>.

deployment of medium bombers.” In his view, the size of the V-bomber fleet was less than optimal due to budgetary constraints.³⁴

As the British came to realize the vulnerability of the V-bomber fleet to preemptive strikes and in-flight attacks, they concluded that they needed a more credible nuclear deterrent delivery platform. London looked to ballistic missiles, both air and ground launched, as the next credible step. London asked Washington if Britain could participate in the collaborative development of nuclear ballistic missile capability. President Eisenhower told Congress that the McMahon Act was no longer relevant with the Soviet Union’s first thermonuclear explosive test in August 1953.³⁵ John Baylis and Alan Macmillan wrote that the *1952 Global Strategy Paper* was an influential document in British nuclear strategy. Although the strategy did not change fundamentally, the British awareness of nuclear strategy matured. In the *1952 Global Strategy Paper*, the Chiefs of Staff wrote, “in the event of war,” Russia would see Britain as “the first and principal target” for nuclear attack; therefore, Britain felt that it had “sound strategic grounds for a British nuclear force.”³⁶ The paper also emphasized the importance of British alliances, especially the relationship with the United States, economic constraints on the British commitment to NATO, and the judgment of the Chiefs of Staff as to the “limits to the value of nuclear weapons and deterrence.”³⁷

The British decided to develop a “liquid-fueled IRBM of 2000 mile range and fired from an ‘unhardened’ silo,” which they called Blue Streak, to act as a strategic nuclear delivery system.³⁸ Blue Streak would be—according to the

³⁴ Ibid., 204.

³⁵ John Baylis, “The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence,” *Journal of Strategic Studies* 31, no. 3 (2008): 430, doi: 10.1080/01402390802024726.

³⁶ John Baylis and Alan Macmillan, “The British Global Strategy Paper of 1952,” *Journal of Strategic Studies* 16, no. 2 (1993): 209, <http://dx.doi.org/10.1080/01402399308437514>.

³⁷ Ibid., 202, 203, 208.

³⁸ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 26, <http://dx.doi.org/10.1080/03071848208523423>.

government's plans—the successor of the V-bombers.³⁹ Washington was developing an air-launched ballistic missile with a range of 800 miles, which the Americans named Skybolt.⁴⁰ The RAF preferred Skybolt missiles because it would maintain the nuclear deterrent responsibility. The Blue Streak missile project was officially cancelled on April 13, 1960 when the Minister of Defense, Harold Watkinson, made the announcement to the House of Commons.⁴¹ The missile was obsolete before it was developed. According to Kevin Harrison,

The 1960 early warning agreement with the US to build Fylingdales would eventually give Britain four minutes warning of a Soviet missile attack. As Blue Streak took at least 20 minutes to fuel-up, it was always extremely vulnerable to a surprise first-strike. Protecting this dinosaur, by building hardened silos, was beyond the willingness and ability of the British government to fund.⁴²

The British hoped to utilize a U.S. missile—Skybolt—instead of their Blue Streak missiles to save time and money. In Harrison's words, "they had placed all their nuclear hopes on its success."⁴³ The Royal Air Force wanted Skybolt as a strategic asset for targeting large cities, which would preserve more V-bombers (and extend their service life), and eliminate the requirement for ground-launched missile silos.⁴⁴ Skybolt was attractive to the British government because it was believed to be a more credible delivery system than aircraft equipped with gravity bombs, and it was cheaper for the British to buy missiles from the Americans than to develop their own.⁴⁵

A. J. R. Groom states in his book *British Thinking about Nuclear Weapons* that there was a debate regarding the nuclear employment strategy that Britain should adopt: massive retaliation or "some form of graduated deterrence."

³⁹ Ibid.

⁴⁰ Ibid., 27.

⁴¹ Ibid.

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Ibid.

Massive retaliation was defined as the use of nuclear weapons to indiscriminately damage an enemy, whereas graduated deterrence was seen as a more tactical use of nuclear weapons for focused strikes. U.S. Secretary of State John Foster Dulles first introduced massive retaliation as a doctrine in January 1954 when addressing the Council on Foreign Relations.⁴⁶ According to Groom, the goal of graduated deterrence was to deter aggression through a capacity for restrained use of atomic and chemical weapons and to prevent an all-out nuclear war.⁴⁷ Sir Anthony Buzzard, a former Chief of Naval Intelligence, supported the idea of graduated deterrence. Groom summarized Buzzard's thinking as follows:

Just as he argued that mutual deterrence was making massive retaliation less credible, and so less effective, as a deterrent, so would mutual deterrence render it difficult to threaten the credible and effective use of strategic hydrogen airpower 'as a means of compelling an aggressor to accept our distinctions in the use of nuclear weapons.'⁴⁸

Since no state had a monopoly on nuclear weapons technology, Buzzard argued, graduated deterrence was the only credible method to utilize nuclear weapons.⁴⁹

The U.S. government cancelled the Skybolt program due to rising development costs and because it "did not really stand a chance against such competition [as the Hound Dog, Polaris, and Minuteman]. It was seen as being too slow to be a first-strike weapon, too vulnerable to an enemy first-strike and lacked both the penetration and accuracy of Minuteman and Polaris."⁵⁰ The United States offered to donate its Skybolt project to Britain and to give the British \$30 million "as a gesture of good faith."⁵¹ The British declined the offer. The British denied that they had refused Washington's offer to sell them the

⁴⁶ Ibid., 60.

⁴⁷ Ibid., 76.

⁴⁸ Ibid., 77.

⁴⁹ Ibid.

⁵⁰ Kevin Harrison, "From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris," *RUSI Journal* 127, no. 4 (1982): 29, <http://dx.doi.org/10.1080/03071848208523423>.

⁵¹ Ibid., 30.

Hound Dog ALBM because of its name.⁵² President Kennedy offered the Polaris submarine-launched ballistic missile to Prime Minister Macmillan and he accepted it.⁵³ The submarines and the nuclear warheads were to be British-made, while the Polaris missiles and support systems were to be bought from the United States. “The Prime Minister made it clear that except where H.M.G. may decide that supreme national interests are at stake, these British forces will be used for the purposes of international defense of the Western Alliance in all circumstances.”⁵⁴

Polaris submarine-launched ballistic missiles were an attractive substitute for the more vulnerable Blue Streak and Skybolt missiles. According to A. J. R. Groom, the British preferred the Skybolt missile but thought that it would be too expensive in the short time it would be used, since the V-bomber force would need to be replaced soon after Britain acquired the Skybolt missile and the bombers were more vulnerable than Polaris submarines. In Groom’s words, initially the “Polaris missile did not have a range which met Britain’s requirements for a strategic weapon but its successor, the A2, carried a one megaton warhead 1500 miles, and was quickly followed by the A3 with a range of 2500 miles.”⁵⁵ Britain finally had an independent delivery platform that was invulnerable to Soviet attack and equipped with missiles that could reach the Soviet Union. Lawrence Freedman argues that, although Polaris improved the British deterrent’s survivability, once the submarine employed a missile, its position was compromised. In his view, the V-bombers had a better chance of finding their

⁵² Ibid.

⁵³ Ibid.

⁵⁴ “Joint Statement Following Discussions with Prime Minister Macmillan—The Nassau Agreement, December 21, 1962,” statement on Nuclear Defense Systems, Par. 8, accessed March 12, 2014, http://www.jfklink.com/speeches/jfk/publicpapers/1962/jfk554_62.html.

⁵⁵ A. J. R. Groom, Groom, *British Thinking about Nuclear Weapons* (London: F. Pinter, 1974), 538.

targets and they could be employed quickly, even though they had only a 50 percent chance of reaching their targets.⁵⁶

Kevin Harrison points out that some critics of the Polaris missile at the time argued that 20 Polaris submarines would be needed to carry the 280 megatons that the V-bomber force could carry, and that relying on four Polaris submarines would decrease Britain's deterrent capability.⁵⁷ The Polaris submarine fleet did, however, offer an invulnerable second-strike platform.⁵⁸ Freedman remarks that the British strategy for Polaris was to use it as a second-strike, "counter-value retaliation" deterrence weapon due to its relative inflexibility and reduced warhead payload in comparison with the V-bombers.⁵⁹

Britain's decision to replace Polaris with U.S. Trident missiles was influenced by its desire for "a sufficient increase in capacity to provide a hedge against Soviet BMD development" and to stay closely connected with the United States, according to John Roper.⁶⁰ Staying connected to the United States meant not only technology compatibility but also decreased costs relative to Britain developing the technology itself. The Trident missile was also designed in response to the growing Soviet ballistic missile defense capabilities; each warhead requires separate targeting once released from the missile itself.⁶¹ One of the biggest upgrades regarding the Trident missile was the number of warheads that could be employed; the Trident C-4 missile could carry eight warheads and the Trident D-5 missile, which the British chose to procure, could

⁵⁶ Lawrence Freedman, "British Nuclear Targeting," *Defense Analysis* 1, no. 2 (1985): 89, <http://dx.doi.org/10.1080/07430178508405190>.

⁵⁷ Kevin Harrison, "From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris," *RUSI Journal* 127, no. 4 (1982): 31, <http://dx.doi.org/10.1080/03071848208523423>.

⁵⁸ *Ibid.*

⁵⁹ Lawrence Freedman, "British Nuclear Targeting," *Defense Analysis* 1, no. 2 (1985): 91, <http://dx.doi.org/10.1080/07430178508405190>.

⁶⁰ John Roper, "The British Nuclear Deterrent and New Developments in Ballistic-Missile Defence," *The World Today* 41, no. 5 (1985): 93, <http://www.jstor.org/stable/40395732>.

⁶¹ *Ibid.*, 92.

carry up to 14.⁶² This increased payload potential “created a requirement to begin a rethink of targeting policy.”⁶³ According to the *1980 Memorandum on Polaris*, the British government believed that “the concept of deterrence is concerned essentially with posing a potential threat to key aspects of Soviet state power.”⁶⁴

Kevin Harrison argued in 1982 that Trident solidified the trend of British dependence on American technology. The increasing age of the Polaris submarine fleet was an influential factor in finding a replacement for Polaris, and Trident was the preferred successor. However, because the American systems were built to achieve American strategic goals, Harrison argued that the systems provided Britain “an irrelevant, barely minimal nuclear deterrent and crumbling conventional forces” at a higher than expected cost.⁶⁵

Today, Britain maintains an independent nuclear deterrent of four Trident submarines stationed in Faslane, Scotland.⁶⁶ Parliament has voted to build a new generation of nuclear weapons-equipped submarines to replace the current fleet. The Final Gate vote regarding final contract and budgetary plans is scheduled to take place in 2016.⁶⁷ Although Parliament has voted to retain Britain’s nuclear deterrent capability, the votes to date have hardly been unanimous. Some members of the Labour Party hold that the nuclear deterrent

⁶² Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 94, <http://dx.doi.org/10.1080/07430178508405190>.

⁶³ Ibid.

⁶⁴ *1980 Memorandum on Polaris* quoted in Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 94, <http://dx.doi.org/10.1080/07430178508405190>.

⁶⁵ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 31, <http://dx.doi.org/10.1080/03071848208523423>.

⁶⁶ Great Britain Ministry of Defence, *The Future of the United Kingdom's Nuclear Deterrent* (London: Stationery Office, 2006), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27378/DefenceWhitePaper2006_Cm6994.pdf, 9.

⁶⁷ Great Britain Ministry of Defence, *The United Kingdom's Future Nuclear Deterrent: 2012 Update to Parliament* (London: Ministry of Defense, 2012), https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/39252/191212a_uk_future_nuc_deter2012_update.pdf, 1.

capability is unnecessary and too expensive. Some observers argue that Britain should keep nuclear weapons but abandon the continuous at-sea deterrence policy.⁶⁸

E. METHODS AND SOURCES

This thesis will analyze the historical development of the British nuclear deterrence program from its roots to 2012, with particular reference to the contemporary thinking that shaped British conduct at the time. The underlying factors that drove the evolution of nuclear strategy throughout Britain's history include technology, perceived national security requirements, budgetary constraints, internal political agendas, national pride, and aspirations to global influence. Historical analysis will be the foundation of the thesis, and the sources utilized will include those discussed in the literature review.

F. THESIS OVERVIEW

This thesis is organized as follows. This thesis proposal will serve as the introduction. Chapter II will discuss the origins of the British nuclear weapons program and will examine Britain's V-Bombers and massive retaliation strategy. Chapter III will discuss Britain's journey towards acquiring a more credible nuclear delivery system—submarine-launched ballistic missiles. Chapter IV will examine Britain's Polaris fleet and the maturation of its deterrence policy and will address the U.S.-UK special relationship during Britain's transition to Trident SLBMs and submarines. Chapter V, the final chapter, will address Britain's post-Cold War strategy regarding nuclear weapons.

⁶⁸ Malcolm Chalmers, "Continuous At-Sea Deterrence: Costs and Alternatives" [brief notes], Royal United Services Institute, 2010, 1–5, <http://www.rusi.org/downloads/assets/CASD.pdf>.

II. BRITAIN AND THE ATOMIC BOMB: BECOMING A NUCLEAR POWER

British scientists discovered atomic energy had potential use for weaponry in 1940. According to Karl Hufbauer, "British physicists... were initially as skeptical as most of their colleagues around the world about the immediate prospects for fission weapons. In April 1940, however, a secret committee of British physicists was established to consider the possibility... that a superbomb might be made from uranium-235."⁶⁹ Without identifying a particular adversary at the time, Britain realized that atomic bombs could be the weapons of the future and that the United Kingdom's possession of them would demonstrate its prestige, status, and military power to the world. Nuclear weapons were seen as a symbol of standing and might, a symbol that Great Britain wanted to acquire.

By 1941, Prime Minister Winston Churchill approved the Ministry of Aircraft Uranium Development (MAUD) committee's recommendation to design and build uranium bombs under the project name "Tube Alloys."⁷⁰ The British believed that, in order to maintain their global power status, they would need the best weapons and the most advanced technology; therefore, Britain began its quest to develop the first atomic bomb.

The MAUD committee report was also sent to the United States to recruit its support and endorsement for nuclear weapons research, and it was a principal element in the United States' choice to develop nuclear weapons. In the words of Karl Hufbauer, "the British report played, that is, a decisive role in the initiation of both the British and American bomb projects."⁷¹ The MAUD report

⁶⁹ Karl Hufbauer, "The Nuclear Age: Britain's Role," *Science* 214, no. 4518 (1981): 324, <http://www.jstor.org/stable/1686877>.

⁷⁰ A. J. R. Groom, "U.S.-Allied Relations and the Atomic Bomb in the Second World War," *World Politics* 15, no. 1 (1962): 126, <http://www.jstor.org/stable/2009571>; Karl Hufbauer, "The Nuclear Age: Britain's Role," *Science* 214, no. 4518 (1981): 324, <http://www.jstor.org/stable/1686877>.

⁷¹ Karl Hufbauer, "The Nuclear Age: Britain's Role," *Science* 214, no. 4518 (1981): 324, <http://www.jstor.org/stable/1686877>.

argued that an atomic bomb could be developed before the end of the Second World War.⁷² President Roosevelt endorsed the construction of an atomic bomb in June 1942.⁷³ Both the United States and Britain were motivated to develop an atomic bomb before the war ended due to the fear of Nazi Germany acquiring the weapon first and using it against the Allies.⁷⁴ If the Germans knew that the Allies had developed atomic bombs, they might be less likely to use them for fear of retaliation.

In 1943, the United States invited Britain to join a collaborative nuclear weapons effort called the Manhattan Project. Although it seems that there would be a risk of rivalry in sharing the development of the atomic bomb, Britain saw that it could benefit from US resources, technology, and alliance support if it worked with the United States and that cooperation would also cut costs and save time. On August 19, 1943, Prime Minister Winston Churchill and President Franklin D. Roosevelt agreed to share nuclear weapons information, resources, and research under the Quebec Agreement.⁷⁵ The British decided that collaborating with the United States would be more beneficial than if they were to develop the bomb unilaterally, and they were, therefore, eager to solidify the arrangement.⁷⁶

Britain combined efforts with the United States and Canada to develop the first atomic bomb.⁷⁷ By 1943, however, Britain was already behind the United States in technical development and was only able to make “minor

⁷² David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939–1956* (New Haven: Yale University Press, 1994), 80.

⁷³ Ibid.

⁷⁴ Ibid., 81.

⁷⁵ Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945–1972*. Vol. 1 (New York: St. Martin's Press, 1974), 6.

⁷⁶ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain's Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 6.

⁷⁷ A. J. R. Groom, “U.S.-Allied Relations and the Atomic Bomb in the Second World War,” *World Politics* 15, no. 1 (1962): 129, <http://www.jstor.org/stable/2009571>.

contributions.”⁷⁸ Ronald W. Clark argues that it was Churchill who was able to influence the United States not to inform Moscow about the nuclear weapons project. According to Ronald W. Clark. “Churchill’s influence was especially pronounced on the issue of disclosure to the Soviet Union. In August 1943 he persuaded Roosevelt of the desirability of nondisclosure to third parties.”⁷⁹

On July 16, 1945, the first atomic bomb explosive test was conducted in the United States.⁸⁰ The successful test of the Manhattan Project’s atomic bomb was a victory for all involved. According to Harrie Massey, “the impressive results achieved by the Manhattan Project were primarily responsible for the belief that, given sufficient resources, a large body of scientists could solve any soluble problem, no matter how difficult, in a relatively short time.”⁸¹ The camaraderie, however, was short-lived. Following the test, the US Congress decided that atomic bomb technology should be restricted to the United States.⁸² A year after the test, on August 1, 1946, President Harry S. Truman signed the McMahon Act of 1946, restricting the transfer of all atomic bomb information and resources to foreign governments, including US allies.⁸³

The McMahon Act brought Britain’s access to the U.S. atomic technology—which the British had helped to develop—to a halt. This act undermined the agreements between President Franklin Roosevelt and Prime Minister Winston Churchill, the Quebec Agreement and Hyde Park Agreement,

⁷⁸ Karl Hufbauer, “The Nuclear Age: Britain’s Role,” *Science* 214, no. 4518 (1981): 324, <http://www.jstor.org/stable/1686877>.

⁷⁹ Ronald W. Clark quoted in Karl Hufbauer, “The Nuclear Age: Britain’s Role,” *Science* 214, no. 4518 (1981): 324, <http://www.jstor.org/stable/1686877>.

⁸⁰ Ferenc Morton Szasz, *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion, July 16, 1945* (Albuquerque, NM: University of New Mexico Press, 1984), 3-4.

⁸¹ Harrie Massey, “Atomic Energy and the Development of Large Teams and Organizations,” *Proceedings of the Royal Society of London: Series A, Mathematical and Physical Sciences* 342, no. 1631(1975): 495, <http://www.jstor.org/stable/78748>.

⁸² Margaret Gowing, *Independence and Deterrence: Britain and Atomic Energy, 1945-1972* Vol. 1 (New York: St. Martin’s Press, 1974), 107–8.

⁸³ A. J. R. Groom, *British Thinking About Nuclear Weapons* (London: Frances Pinter, 1974), 29.

which promised continued nuclear information sharing post-World War II. The US government denied knowing about the agreement. As Richard Gott put it,

Mr. Roosevelt died, and the note signed at Hyde Park in 1944 was lost among his papers. The Quebec agreement had been an executive agreement, binding only on the administration that negotiated it. Worried senators, jealous of America's lead in atomic energy and anxious to keep it, had never seen the agreement.⁸⁴

Prime Minister Clement Attlee justified the development of a British bomb following what the British saw as a betrayal by the United States when he stated, "We had to bear in mind that there was always the probability of (the Americans) withdrawing and becoming isolationists once again. The manufacture of a British atom bomb was therefore at that stage essential to our defence."⁸⁵

Britain preserved its conviction that it wanted to possess nuclear weapons to establish its global status. The British also judged that if they became a nuclear power on their own, the United States would be more likely to collaborate with them again. Britain was not willing to be left behind the technological curve or dropped from global-power club. Therefore, in January 1947, Prime Minister Clement Attlee reestablished Britain's national nuclear weapons program.⁸⁶ Foreign Secretary Ernest Bevin affirmed that Britain needed autonomous atomic weapons: "We've got to have this thing over here whatever it costs... We've got to have the bloody Union Jack on top of it."⁸⁷ Britain quickly established a team of scientists to make Britain a nuclear power.

The High Explosives Research (HER) team was established with the mission of producing Britain's first nuclear weapon. The name, HER, was used to

⁸⁴ Richard Gott, "The Evolution of the Independent British Deterrent," *International Affairs* 39, no. 2 (1963): 240, <http://www.jstor.org/stable/2611300>.

⁸⁵ Clement Attlee quoted in Richard Gott, "The Evolution of the Independent British Deterrent," *International Affairs* 39, no. 2 (1963): 240, <http://www.jstor.org/stable/2611300>.

⁸⁶ A. J. R. Groom, *British Thinking about Nuclear Weapons* (London: Frances Pinter, 1974), 35.

⁸⁷ Ernest Bevin quoted in Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007), 48.

disguise the project's mission.⁸⁸ Fort Halstead, England, was chosen as the headquarters for nuclear weapon research and experimentation, but the project's purpose remained a secret to many government officials. "The link between this project and the fort was a closely guarded secret, to the extent that even within government all orders were routed through the largely civil Atomic Energy Research Establishment (AERE)... until 1949."⁸⁹ Chief Superintendent Armaments Research (CSAR) William Penney was put in charge of the project. Penney had been a key figure in Britain's contribution to the Manhattan Project in the United States.⁹⁰ The project also included RAF scientists and other international scientists, including the émigré German scientist Klaus Fuchs who visited Fort Halstead to pass on information he had learned in the United States under the auspices of Manhattan Project.⁹¹ According to Wayne Cocroft, "The urgency and importance of the work at Fort Halstead is reflected in the preparation of a design drawing for the Bomb Chamber. . . in July 1947, only two months after the formation of the High Explosives Research (HER) team."⁹² According to Humphrey Wynn, "the RAF team was starting from scratch, but had the benefit of [Dr. William] Penney's knowledge and experience in the oversight of their work."⁹³

The Soviet Union's successful atomic bomb explosive test in August 1949 took the world by surprise. The Soviet Union had been building nuclear weapon production capability as Britain and the United States worked on the Manhattan Project.⁹⁴ Soviet spies were able to infiltrate British and American nuclear

⁸⁸ Wayne D. Cocroft, *A Brief Assessment of the Role of Fort Halstead*, Research Department Report Series no. 49 (2010): 6, http://services.english-heritage.org.uk/ResearchReportsPdfs/049_2010WEB.pdf.

⁸⁹ Ibid.

⁹⁰ Ibid.

⁹¹ Ibid., 7.

⁹² Ibid., 10.

⁹³ Humphrey Wynn, *The RAF Strategic Nuclear Deterrent Forces: Their Origins, Roles and Deployment 1946–1969, A Documentary History* (London: The Stationery Office, 1994), 30.

⁹⁴ David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939–1956* (New Haven: Yale University Press, 1994), 101.

facilities, including those associated with the Manhattan Project, and deliver information back to the Soviet Union.⁹⁵ Beginning in 1941, the Soviet Union began to collect information and updates regarding atomic progress. In David Holloway's words, "The Soviet government now knew that Britain had decided to build an atomic bomb, that British scientists estimated that it would take between two and five years to do this," and that gaseous diffusion and uranium-235 would be used.⁹⁶ According to David Holloway, "before the end of 1942 Stalin took the decision to restart nuclear research. This research finally got under way early in 1943."⁹⁷ Klaus Fuchs was known to be one of the conduits of information from the Manhattan Project to the Soviet Union.⁹⁸ Igor Kurchatov, a Soviet physicist, became very familiar with progress of the Manhattan Project. "In July 1943 Kurchatov wrote another memorandum... about intelligence on the Manhattan project. It is evident from this memorandum that the Soviet Union had received extensive information about the progress of the United States effort."⁹⁹ The Soviet Union even requested nuclear materials from the United States, and the United States delivered them.

At the end of January 1943 the Soviet government sent a request to the Lend-Lease Administration in Washington, DC for 10 kilograms of uranium metal, and 100 kilograms each of uranium oxide and uranium nitrate. General Groves approved this request, for fear that refusal would alert the Soviet Union to the American project or excite curiosity in Washington.¹⁰⁰

As soon as the United States halted all international nuclear collaboration in 1946, Britain fell behind the Soviet Union in atomic bomb development.

Britain felt under pressure to catch up with the United States and the Soviet Union in atomic capability. At the same time, the Soviet Union became a

⁹⁵ Ibid., 82–83.

⁹⁶ Ibid., 82.

⁹⁷ Ibid., 85.

⁹⁸ Ibid., 83.

⁹⁹ Ibid., 103.

¹⁰⁰ Ibid., 101.

greater threat to Britain's security with its acquisition of nuclear weapons. In the late 1940s, Britain identified the Soviet Union as a real and potentially imminent threat to its security. As noted in the introduction, Lawrence Freedman has argued "that until 1948 there was no official permission to consider the Soviet Union an 'enemy.'"¹⁰¹ Not only were nuclear weapons important to the United Kingdom's status and future alliance strategy; they were also imperative to ensure Britain's security against the Soviet Union.

The speed of Soviet long-range missile development was a source of concern for Britain's trust in the U.S. promise of extended deterrence. If the Soviet Union's long-range missiles could reach North America, some Britons reasoned, the United States would be less likely to engage in war with the Soviet Union on Britain's behalf for fear of endangering its own security.¹⁰² Margaret Gowing argues that that the British need for atomic weapons did not stem from a sense of fear of the Soviet Union, but instead arose from "a feeling that atomic weapons were a manifestation of the scientific and technological superiority on which Britain's strength... must depend."¹⁰³ Despite the fact that the United Kingdom had worked with the United States in the development of nuclear weapons, the manufacture of Britain's first atomic bomb took longer and was much higher in cost than anticipated.

Britain achieved nuclear weapons status on October 3, 1952 with its first successful explosive test on Monte Bello Islands, Australia:¹⁰⁴ three years after the Soviet Union and seven years after the United States.¹⁰⁵ One may ask why it

¹⁰¹ Lawrence Freedman, "British Nuclear Targeting," *Defense Analysis* 1, no. 2 (1985): 82, <http://dx.doi.org/10.1080/07430178508405190>.

¹⁰² Andrew J. Pierre, *Nuclear Politics: The British Experience with an Independent Strategic Force, 1939–1970* (London: Oxford University Press, 1972), 162.

¹⁰³ John Baylis, *Ambiguity and Deterrence: British Nuclear Strategy, 1945–1964* (Oxford: Clarendon Press, 1995), 54.

¹⁰⁴ Wayne D. Cocroft, "A Brief Assessment of the Role of Fort Halstead," *Research Department Report Series* no. 49-2010 (2010): 16, http://services.english-heritage.org.uk/ResearchReportsPdfs/049_2010WEB.pdf.

¹⁰⁵ A. J. R. Groom, "The British Deterrent," in *British Defence Policy in a Changing World*, ed. John Baylis (London: Croom Helm, 1977), 126.

took Britain so long to develop nuclear weapons after starting its atomic weapons program in 1940 and working closely with the United States for three years until the McMahon Act of 1946.

The answer is multidimensional: economics, resource access, and scientific knowledge. The exertions of World War II meant that the British economy had taken a severe hit. The funding required for expensive nuclear materials, testing facilities, and personnel was not readily available in the defense budget. After the McMahon Act entered into force, nuclear materials were hard to obtain. In addition, enriching uranium and producing plutonium were time consuming and costly tasks. According to Humphrey Wynn, “while the international situation gave increased urgency to the military atomic energy programme, its real pace-maker was the supply of plutonium.”¹⁰⁶

Finally, scientific knowledge of the production of nuclear weapons was not widespread following the Manhattan Project. Very few British scientists had the ability to make weapons. In Humphrey Wynn’s words, “the only man in Britain in 1946-47 with first-hand experience of designing, building and testing atomic bombs was Dr. [William] Penney.”¹⁰⁷ As mentioned previously, German émigré scientist Klaus Fuchs was known to have assisted the British in developing nuclear weapons as well as the Soviet Union—and he was later exposed as a Soviet spy.¹⁰⁸ The 1952 nuclear explosive test marked the culmination of years of work in obtaining the resources and applying the knowledge needed to produce Britain’s own nuclear weapon from scratch.

Following October 1952, Britain possessed the technology but had not developed a strategy for the use of nuclear weapons. Due to their unmatched destructive capability, nuclear weapons were viewed as tools to obliterate the

¹⁰⁶ Humphrey Wynn, *The RAF Strategic Nuclear Deterrent Forces: Their Origins, Roles and Deployment 1946–1969, A Documentary History* (London: The Stationery Office, 1994), 33.

¹⁰⁷ *Ibid.*, 29.

¹⁰⁸ Wayne D. Cocroft, “A Brief Assessment of the Role of Fort Halstead,” *Research Department Report Series* no. 49-2010 (2010): 7, http://services.english-heritage.org.uk/ResearchReportsPdfs/049_2010WEB.pdf.

enemy on the battlefield and to hold enemy cities at risk. Britain's first nuclear weapons were large and heavy, and could not be quickly employed by any delivery system but aircraft at the time. The British looked to aircraft as their nuclear weapons delivery vehicle for this reason; aircraft could travel relatively long distances quickly while carrying heavy cargo.

Britain developed atomic strike capability using aircraft as the delivery platform a few years following its first successful nuclear test. The British named these atomic-weapons capable aircraft Canberras and V-bombers. The Royal Air Force (RAF) fought tirelessly to govern the nuclear delivery vehicles. RAF leaders did not want the responsibility to be given to any other military service.¹⁰⁹ The V-bombers, according to the Air Staff at the time, were to be used to threaten Russian cities.

Attacks must therefore be directed against objectives whose destruction will lower enemy morale, reduce their industrial capacity, and dislocate a large part of the centralized administrative machinery of the country. The only objectives that fulfill these requirements are large cities, and it is our considered opinion that our only chance of securing a quick decision is by launching a devastating attack upon them with absolute weapons.¹¹⁰

Threatening to attack Soviet cities was viewed as the most effective strategy for victory and deterrence.¹¹¹ The Soviet Union was less vulnerable to nuclear attack than Britain because its population and infrastructure were so spread out; therefore, Britain had to make up for its disadvantage in the size of its bomber fleet, according to the RAF.¹¹²

There were disagreements among government officials as to what size the bomber fleet should be. The military, including the RAF, argued that the fleet

¹⁰⁹ S. J. Ball, *The Bomber in British Strategy: Doctrine, Strategy, and Britain's World Role, 1945–1960* (Boulder, Colorado: Westview Press, Inc., 1995), 49.

¹¹⁰ Report by the Royal Air Force Future Planning Staff, February 6, 1947, quoted in S. J. Ball, *The Bomber in British Strategy: Doctrine, Strategy, and Britain's World Role, 1945–1960* (Boulder, Colorado: Westview Press, Inc., 1995), 23.

¹¹¹ *Ibid.*, 23.

¹¹² *Ibid.*, 49.

should be no less than 240 bombers. British Minister of Defence “Selwyn Lloyd was adamant that it would not be possible to reduce the proposed force below 240 units.”¹¹³ According to Lloyd, the bombers would first strike air bases to prevent the Soviets from launching strikes on Britain. The bombers would then be ordered to stunt the Soviet ground forces, and finally they would attack remaining Soviet nuclear resources and infrastructure.¹¹⁴ Lloyd predicted that the Soviets could possess 850 bombers of their own, launched from 40 air bases with the capability of launching from an additional 150 alternate locations.¹¹⁵ In addition, Martin Navias has reported, “the RAF believed that only 50 percent of its front-line medium bombers would reach their targets.”¹¹⁶

Defence budget cuts reduced bomber procurement from 240 to 200, and they were reduced again to a fleet of only 180. Chief of the Air Staff William Dickson argued against the fleet reduction, and said, “our proposed contribution [of 240 bombers] was certainly the minimum necessary.”¹¹⁷ In addition, the RAF believed in 1952 that the bomber force would serve as an effective deterrent and would significantly decrease the need for conventional forces.¹¹⁸ The RAF proposed, therefore, alleviating the budgetary requirements for a robust conventional force and allocating additional funding to the nuclear-equipped bomber force.

With the establishment of Britain’s independent atomic weapons and delivery platforms, the British government hoped to gain support from the United States for future collaborative projects. The United States agreed to open the

¹¹³ Selwyn Lloyd quoted in Martin S. Navias, “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955–56,” *Journal of Strategic Studies* 11, no. 2 (1988): 206, <http://dx.doi.org/10.1080/01402398808437338>.

¹¹⁴ *Ibid.*, 207.

¹¹⁵ *Ibid.*

¹¹⁶ *Ibid.*

¹¹⁷ Chief of the Air Staff William Dickson quoted in Martin S. Navias, “Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955–56,” *Journal of Strategic Studies* 11, no. 2 (1988): 208, <http://dx.doi.org/10.1080/01402398808437338>.

¹¹⁸ S. J. Ball, *The Bomber in British Strategy: Doctrine, Strategy, and Britain’s World Role, 1945-1960* (Boulder, Colorado: Westview Press, Inc., 1995), 49.

door to nuclear sharing with Britain once it had been established that both Britain and the Soviet Union possessed nuclear weapons and the United States no longer held the nuclear monopoly. According to Harrison,

The Washington Declaration and Eisenhower's State of the Union Message of January 1958, attacking 'artificial barriers to sharing' knowledge between 'friendly allies,' led to changes in the McMahon Act greatly expanding the authorized areas for nuclear information exchange to include military purposes.¹¹⁹

The United States also judged that working on nuclear weapons with the British would allow it to influence British policy.¹²⁰

Britain and the United States began collaboration on ballistic missiles. The British decided to develop a "liquid-fueled IRBM of 2000 mile range and fired from an 'unhardened' silo," which they called Blue Streak, to act as a strategic nuclear delivery system.¹²¹ The British planned to make Blue Streak the successor of the V-bombers.¹²² Washington was developing an air-launched ballistic missile named Skybolt with a range of 800 miles.¹²³ The British viewed both Skybolt and Blue Streak as potential replacement delivery systems for nuclear weapons—delivery systems that would increase their deterrence credibility. The V-Bombers were vulnerable to preemptive and inflight targeting, they risked human operators' lives, and they probably would not always reach their targets. The British hoped that the Blue Streak and Skybolt programs would prove to be superior to the V-Bombers in their technical performance characteristics.

¹¹⁹ Kevin Harrison, "From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris," *RUSI Journal* 127, no. 4 (1982): 26, <http://dx.doi.org/10.1080/03071848208523423>.

¹²⁰ *Ibid.*

¹²¹ *Ibid.*

¹²² *Ibid.*

¹²³ *Ibid.*, 27.

THIS PAGE INTENTIONALLY LEFT BLANK

III. PLATFORM WORTHY OF THE ULTIMATE WEAPON: BRITAIN'S JOURNEY TOWARD A CREDIBLE DETERRENT

In 1954, the Cold War was underway and Britain saw the Soviet Union as a severe nuclear threat. Britain recognized, however, that its V-bomber force was not a credible deterrent for Soviet aggression. The V-bombers were vulnerable to preemptive strikes while parked at airbases, as well as in-flight interception. Due to these vulnerabilities, the chances that the nuclear-armed aircraft would reach their targets and prove an effective delivery platform were low. According to Lawrence Freedman, "the RAF [Royal Air Force] believed that only 50 percent of its front-line medium bombers would reach their targets."¹²⁴ The Soviets recognized the vulnerabilities of the aircraft, and it further degraded the V-bombers' deterrence credibility.

Britain sought a better, more effective nuclear delivery system to replace the V-Bombers. Britain proposed a collaborative project with the United States in 1954 to develop ballistic missiles. In 1949, after the Soviet Union conducted its first successful nuclear explosive test, "there were hopes in Britain that the Soviet test would lead the Americans to abandon the McMahon Act."¹²⁵ The United States was more willing to share nuclear weapons information and resources with Britain now that Washington did not have a monopoly on the nuclear weapons market. Washington and London faced a common enemy, and Britain had with its 1952 nuclear weapons test established itself as a nuclear power.¹²⁶ President Eisenhower criticized the McMahon Act following the Soviet thermonuclear explosive test in 1953. In his judgment, "it was a 'terrible piece of legislation' and 'one of the most deplorable incidents in American history of which

¹²⁴ Lawrence Freedman, "British Nuclear Targeting," *Defense Analysis* 1, no. 2 (1985): 89, <http://dx.doi.org/10.1080/07430178508405190>.

¹²⁵ John Baylis, "The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence," *Journal of Strategic Studies* 31, no. 3 (2008): 428, <http://dx.doi.org/10.1080/01402390802024726>.

¹²⁶ A. J. R. Groom, "The British Deterrent," in *British Defence Policy in a Changing World*, ed. John Baylis (London: Croom Helm, 1977), 132.

he personally felt ashamed.”¹²⁷ Britain agreed to work with the United States again since “the Government was looking to assistance from the United States to alleviate the budgetary and skilled-manpower pressure which maintenance of the strategic deterrent was coming to place on defence policy.”¹²⁸ Britain was to create a medium-range ballistic missile and the United States was to develop an intercontinental ballistic missile with a range of over 5,000 nautical miles.

Ballistic missiles were an attractive nuclear delivery means because they could engage targets at long ranges, were harder to intercept during flight than aircraft, and did not deteriorate and require as much rebuilding as aircraft. The change in platform forced a change in strategy for the British government. Lawrence Freedman remarks that the British strategy for Polaris was to use it as a second-strike, “counter-value retaliation” deterrence weapon due to its relative inflexibility and reduced warhead payload in comparison with the V-bombers.¹²⁹

Initially, Great Britain viewed nuclear weapons as total annihilation weapons and the strategy for their use was massive retaliation. In the words of Kevin Harrison, “both the United States and Britain placed a heavy reliance on nuclear weapons and the advocacy of massive retaliation to deter Soviet aggression.”¹³⁰ During Britain’s journey from gravity bombs to ballistic missiles, London changed its strategy from massive retaliation to graduated deterrence. Britain realized that the threat of massive retaliation was only credible in the absence of mutually assured destruction. According to Kevin Harrison,

The 1962 Defence White Paper moved away from the doctrine of massive retaliation, but nevertheless still assumed a swift

¹²⁷ John Baylis, “The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence,” *Journal of Strategic Studies* 31, no. 3 (2008): 430, <http://dx.doi.org/10.1080/01402390802024726>.

¹²⁸ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 6.

¹²⁹ Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985): 91, <http://dx.doi.org/10.1080/07430178508405190>.

¹³⁰ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 25, <http://dx.doi.org/10.1080/03071848208523423>.

escalation to nuclear war and placed their emphasis on war deterring rather than building up large conventional forces with which to fight a conventional war.¹³¹

As technology improved for the deployment and targeting of nuclear forces, Great Britain realized that nuclear weapons could be used for more tactical, tailored defense, which A.J.R. Groom calls “graduated deterrence.”¹³²

Project Blue Streak was the United Kingdom’s medium-range ballistic missile program created in response to the V-Bombers’ vulnerabilities.¹³³ It was to be the “potential successor to the V-bomber force in the mid-1960s” and was designed to be “a liquid-fueled IRBM of 2000 mile range and fired from an ‘unhardened’ silo.”¹³⁴ The missile was designed with the intent to decrease the risk of preemptive and inflight attacks by being launched from land, instead of from an aircraft, and with increased speed.

The missile was also designed with enough range to reach the Soviet Union, in the hope that it would deter Soviet aggression or be able to retaliate in the event of a nuclear war. During development, however, the Blue Streak missile still proved to be vulnerable. The project proved to be more costly than originally anticipated, was not going as fast as the United States’ ballistic missile project, and was also seen as too vulnerable to preemptive attack.¹³⁵ The Blue Streak missile project was officially cancelled on April 13, 1960, when the

¹³¹ Ibid., 29–30.

¹³² A. J. R. Groom, *British Thinking on Nuclear Weapons* (London: F. Pinter, 1974), 75.

¹³³ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 160.

¹³⁴ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 26, <http://dx.doi.org/10.1080/03071848208523423>.

¹³⁵ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 176.

Minister of Defense, Harold Watkinson, made the announcement to the House of Commons.¹³⁶ The missile was obsolete before it was developed. According to Kevin Harrison,

The 1960 early warning agreement with the US to build Fylingdales would eventually give Britain four minutes warning of a Soviet missile attack. As Blue Streak took at least 20 minutes to fuel-up, it was always extremely vulnerable to a surprise first-strike. Protecting this dinosaur, by building hardened silos, was beyond the willingness and ability of the British government to fund.¹³⁷

The British placed their hopes in the Skybolt missile to become their next nuclear delivery system. The Skybolt missile, developed by the United States, was an air-launched ballistic missile to be utilized by the British V-Bomber fleet. Kevin Harrison has described British planning at that time as follows: “The new missile would greatly extend the life of the all-British V-bomber force, probably into the late 1960s and early 1970s.”¹³⁸ Adapting the V-bombers to carry the Skybolt missile was estimated to be less expensive than the Polaris fleet and some argued that it would create more domestic employment than building and operating the Polaris fleet. In addition, the V-bombers could also conduct conventional operations, making them more versatile.

The RAF’s leaders wanted the British government to procure Skybolt missiles because they sought “to retain the British nuclear deterrent in their hands for prestige purposes.”¹³⁹ The RAF argued that the Skybolt missile would decrease the number of V-bombers lost due to the missile’s increased range, relative to the probable losses from gravity bomb operations. Skybolt would also eliminate the need for land-based missile silos, keeping costs down.¹⁴⁰

¹³⁶ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 26, <http://dx.doi.org/10.1080/03071848208523423>.

¹³⁷ *Ibid.*, 27.

¹³⁸ *Ibid.*

¹³⁹ *Ibid.*

¹⁴⁰ *Ibid.*

Although the British saw the Skybolt missile as the next preferred nuclear delivery platform, the United States' enthusiasm for the program had steadily decreased with its development of the Minuteman, Hound Dog, and Polaris missiles. The Minuteman's precision land-based targeting eliminated the need for bombers. "Hound Dog was far more accurate than Skybolt... cheaper; more difficult to track; had an estimated life expectancy with the B25H bomber of up to 1975; and actually worked!"¹⁴¹ Polaris submarine-launched ballistic missiles were not vulnerable to preemptive strikes, could carry a greater payload than Skybolt missiles, and could travel further. "Skybolt did not really stand a chance against such competition."¹⁴² The Skybolt project was expensive and took more time to develop than alternative U.S. missile projects. The United States cancelled the Skybolt project and placed more emphasis on the development of alternative ballistic missiles, including Polaris.

In July 1958, the governments of Great Britain and the United States agreed to formalize a nuclear partnership and collaboration in signing the U.S.-UK Mutual Defense Agreement.¹⁴³ This agreement covered the sharing of nuclear information, training opportunities, plans, etc. and was more comprehensive in scope than less formal agreements between the United States and other NATO countries. This agreement formalized the nuclear dimension of the US-UK special nuclear relationship, and it was made with a view to rebuilding relations between the two countries, which had been damaged by the McMahon Act.¹⁴⁴

Although the U.S.-manufactured Thor missiles were the first collaborative nuclear missiles deployed in the United Kingdom, Britain did not own the

¹⁴¹ Ibid., 29.

¹⁴² Ibid.

¹⁴³ John Baylis, "The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence," *Journal of Strategic Studies* 31, no.3 (2008): 425, <http://dx.doi.org/10.1080/01402390802024726>.

¹⁴⁴ Richard N. Rosecrance, *Defense of the Realm: British Strategy in the Nuclear Epoch* (New York: Columbia University Press, 1968), 252.

missiles. They were owned by the United States. According to John Baylis, “The warheads would remain under American control, as U.S. law required, but a joint Anglo-American decision would be required before the missiles were launched.”¹⁴⁵ There was “an agreed understanding that, in a crisis, the RAF’s nuclear-capable aircraft would come under American command, in exchange for a pledge by the US government to consult the British government on potential nuclear use, time and circumstances permitting.”¹⁴⁶ The United States wanted Thor to be available for the extended deterrence protection of NATO but the United Kingdom opposed the proposal because it did not want to be pulled into a nuclear war without a choice. According to Martin A. Smith,

Concern about being drawn into a nuclear exchange with the USSR virtually automatically if any NATO member were attacked, even if the invaders used only conventional force, was combined with concerns about losing sovereign national control over decisions about not just whether, but also how, to commit the UK to war.¹⁴⁷

Therefore, Britain strongly affirmed its desire to procure an independent nuclear deterrent, over which it would maintain complete control and authority.

President Kennedy met with Prime Minister Macmillan in Nassau, the Bahamas, in 1962 to negotiate terms for a replacement delivery system following the U.S. cancellation of the Skybolt project. The United States offered to donate its Skybolt project to Britain “recalling that the purpose of the offer of Skybolt to the United Kingdom in 1960 had been to assist in improving and extending the effective life of the British V-bombers,”¹⁴⁸ and to give the British \$30 million “as a

¹⁴⁵ John Baylis, “The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence,” *Journal of Strategic Studies* 31, no.3 (2008): 434, <http://dx.doi.org/10.1080/01402390802024726>.

¹⁴⁶ Martin A. Smith, “British Nuclear Weapons and NATO in the Cold War and Beyond,” *International Affairs* 87, no. 6 (2011): 1388.

¹⁴⁷ *Ibid.*, 1389.

¹⁴⁸ “Joint Statement Following Discussions With Prime Minister Macmillan - The Nassau Agreement, December 21, 1962,” statement on Nuclear Defense Systems, Par. 2, accessed March 12, 2014, http://www.jfklink.com/speeches/jfk/publicpapers/1962/jfk554_62.html.

gesture of good faith.”¹⁴⁹ The British declined the offer, knowing that they could not afford the costs associated with finishing Skybolt.¹⁵⁰ The United States then offered Britain its Hound Dog missile, but Britain again declined. The British denied that they had refused Washington’s offer to sell them the Hound Dog ALBM because of its name.¹⁵¹

President Kennedy agreed to sell Britain the United States’ Polaris submarine-launched ballistic missiles under the Nassau Agreement of 1962. The British government initially believed that “Skybolt would be considerably cheaper than Polaris, would allow the Government to recoup its investment in the V-Bomber force, and offered an attractive degree of operational flexibility.”¹⁵² Although submarines were not Great Britain’s first choice in nuclear delivery platforms, this agreement finally solidified its path to a credible independent deterrent.¹⁵³ According to A. J. R. Groom,

The original Polaris missile did not have a range which met Britain’s requirements for a strategic weapon but its successor, the A2, which entered service in the early sixties, carried a one megaton warhead 1500 miles, and it was quickly followed by the A3 with a range of 2500 miles.¹⁵⁴

Kevin Harrison points out that some critics of the Polaris missile at the time argued that 20 Polaris submarines would be needed to carry the 280 megatons that the V-bomber force could carry, and that relying on four Polaris submarines would decrease Britain’s deterrent capability.¹⁵⁵ The Polaris

¹⁴⁹ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 30, <http://dx.doi.org/10.1080/03071848208523423>.

¹⁵⁰ *Ibid.*

¹⁵¹ *Ibid.*, 29.

¹⁵² Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain’s Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 282.

¹⁵³ Andrew J. Pierre, *Nuclear Politics: The British Experience with an Independent Strategic Force, 1939–1970* (London: Oxford University Press, 1972), 231.

¹⁵⁴ A. J. R. Groom, *British Thinking about Nuclear Weapons* (London: F. Pinter, 1974), 538.

¹⁵⁵ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 31, <http://dx.doi.org/10.1080/03071848208523423>.

submarine fleet did, however, offer an invulnerable second-strike platform.¹⁵⁶ There was also hesitation about procuring Polaris because it increased Britain's reliance on the United States and further complicated Britain's standing as an independent nuclear power. According to Ian Clark, "because purchase of an American missile would erode the independence of the British deterrent, it was recommended that thought be given to developing a Polaris-type solid-fuelled missile indigenously."¹⁵⁷ The idea of a British-made SLBM was quickly abandoned due to high estimated costs.

Polaris submarines were built in the United Kingdom as well as the nuclear warheads carried onboard. The British government thought that it was important to maintain some autonomy in the development of its nuclear delivery platforms not only to boost its domestic industry but also to demonstrate its independence from the United States. Exhibiting independence from the United States was felt to strengthen the British nuclear deterrent because the United Kingdom could act unilaterally for its national security purposes. Therefore, the United States only provided the Polaris missiles and support systems. Britain finally had an independent delivery platform that was invulnerable to Soviet attack and equipped with missiles that could reach the Soviet Union. Britain had gained considerable ground in its journey towards a credible nuclear deterrent. In the words of Kevin Harrison, "The Nassau Agreements guaranteed the future of the British nuclear deterrent."¹⁵⁸

Britain chose to build a fleet of four Polaris submarines. Possessing four nuclear-armed submarines ensured the redundancy that Britain wanted in order to increase force survivability in the event of a nuclear attack. One submarine was deployed at all times so that Britain would have at least one nuclear delivery platform that was virtually invulnerable to preemptive attack and that would act in

¹⁵⁶ Ibid.

¹⁵⁷ Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain's Deterrent and America, 1957–1962* (Oxford: Clarendon Press, 1994), 285.

¹⁵⁸ Kevin Harrison, "From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris," *RUSI Journal* 127, no. 4 (1982): 31, <http://dx.doi.org/10.1080/03071848208523423>.

retaliation. The other three submarines rotated into the deployment position after a sequence of heavy and light maintenance periods and training cycles. Maintenance and training prepared the submarines and their crews for deployment and helped to extend the service life of the submarines.

Britain recognized the Allied desire for its resources to be committed in support to NATO, including both conventional and nuclear forces.¹⁵⁹ President Kennedy also emphasized the need to commit Polaris to NATO because “he still faced the problem of how to reconcile this [selling Polaris to Britain] with a desire to halt proliferation in NATO by means of a Multilateral Nuclear Force (MLNF) and improving America’s relations with the French.”¹⁶⁰ Prime Minister Macmillan agreed to commit Britain’s nuclear capability to the defense of NATO under the MLNF, along with Britain’s nuclear ally—the United States. Under the Nassau Agreement of 1962,

the President and the Prime Minister agreed that the purpose of their two governments with respect to the provision of the Polaris missiles must be the development of a multilateral NATO nuclear force in the closest consultation with other NATO allies.¹⁶¹

Britain, however, would retain the ability to withdraw its nuclear weapons from NATO missions if they were needed for national security. In the words of the “Nassau Statement on Nuclear Defense Systems,” “The Prime Minister made it clear that except where H.M.G. may decide that supreme national interests are at stake, these British forces will be used for the purposes of international defense of the Western Alliance in all circumstances.”¹⁶² Britain viewed this as a crucial provision so that its nuclear forces would be available to serve Britain’s interests and security above any other commitments. According to Martin A. Smith,

¹⁵⁹ John Baylis, *Ambiguity and Deterrence: British Nuclear Strategy, 1945-1964* (Oxford: Clarendon Press, 1995), 233.

¹⁶⁰ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *RUSI Journal* 127, no. 4 (1982): 30, <http://dx.doi.org/10.1080/03071848208523423>.

¹⁶¹ “Joint Statement Following Discussions with Prime Minister Macmillan - The Nassau Agreement, December 21, 1962,” statement on Nuclear Defense Systems, Par. 7, accessed March 12, 2014, http://www.jfklink.com/speeches/jfk/publicpapers/1962/jfk554_62.html.

¹⁶² *Ibid.*, Par. 8.

The Macmillan government had deliberately chosen to offer to *earmark* a future Polaris force for potential NATO missions, rather than *assign* it to NATO. In established NATO parlance there was an important difference between these concepts. Earmarked forces were declared as being prospectively available to allied command in times of crisis or conflict, but their release would have to be formally requested, and it could in principle be refused by the national government concerned.¹⁶³

Britain's decision to earmark vice assign its nuclear forces for NATO extended deterrence allowed it to maintain its primary policy of maintaining an independent nuclear deterrent for its own national security. This policy stemmed from its fear of being dragged into a nuclear war without choice, owing to the U.S. desire to commit Thor missiles to NATO. With this policy, the ultimate authority for use of British nuclear weapons would remain with the British government.¹⁶⁴

The extended deterrence commitment of both Britain and the United States to NATO further discouraged potential aggressors from nuclear war with any of the NATO members. The British and the Americans agreed that the United Kingdom's independent forces in conjunction with those of the United States created multiple centers of decision-making and complicated the risk assessment problem for adversaries and might therefore further deter a potential aggressor from action, than if Britain were to act alone. In addition, Britain's "clear preference was for exclusive, bilateral 'top table' arrangements with the United States, with the rest of the NATO membership effectively relegated to second-tier involvement, if indeed their views were to be given serious consideration at all."¹⁶⁵ The U.S.-U.K. top-tier arrangement gave Britain the power and influence it had wanted in becoming a nuclear power. It also strengthened the nuclear special relationship and collaboration, which Britain

¹⁶³ Martin A. Smith, "British Nuclear Weapons and NATO in the Cold War and Beyond," *International Affairs* 87, no. 6 (2011): 1391.

¹⁶⁴ *Ibid.*, 1392.

¹⁶⁵ Martin A. Smith, "British Nuclear Weapons and NATO in the Cold War and Beyond," *International Affairs* 87, no. 6 (2011): 1387.

highly valued. Britain saw little need for non-nuclear-weapon-state NATO countries to participate in the decision-making process for nuclear policy and wanted to restrict it to the United States and Britain.¹⁶⁶

There was also a concern throughout Europe, including Britain, that the United States might not fulfill its extended deterrence commitment if Europe was attacked by the Soviet Union. This was one of the motivating factors for Britain to establish an independent nuclear deterrent, and it also was a concern for other NATO members. The idea that “the United States would not risk nuclear retaliation against its own cities by using nuclear weapons in response to Soviet aggression in Europe”¹⁶⁷ influenced Prime Minister Harold Macmillan to write to President Kennedy in February 1962 as follows:

One can argue quite plausibly that the existence of the British nuclear force gives some comfort both to those Europeans who fear that the United States might, in the last resort, shrink from using the nuclear deterrent for the defence of Europe and to those who, contrariwise, are worried lest America might use it too precipitately.¹⁶⁸

Alastair Buchan in 1960 argued, “If the US guarantee really was believed to be credible, there would logically be little need for a second, European-based, strategic nuclear capability within NATO.”¹⁶⁹ Therefore, Britain’s commitment to NATO was two-fold: it sought to build relations with the United States and to reassure European allies.

Britain’s journey toward gaining a credible nuclear deterrent posture did not transpire the way it had initially planned. Yet, Britain’s willingness to remain flexible and its aspiration to reestablish a collaborative relationship with the United States led ultimately to Britain’s acquisition of a credible nuclear delivery platform. The growing sophistication of nuclear weapons and delivery systems

¹⁶⁶ Ibid., 1396.

¹⁶⁷ Ibid., 1394.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid.

led to a shift in nuclear strategy, from threats to conduct massive retaliation attacks to graduated targeting and deterrence. Britain was able to sustain its policy of independence while working with the United States and committing to the protection of NATO. Although Britain succeeded in acquiring a more credible nuclear delivery platform to follow the V-Bombers, Britain continues its journey to develop policies and delivery platforms worthy of the ultimate weapon.

IV. MATURATION OF DETERRENCE POLICY: BRITAIN'S TRANSITION FROM POLARIS TO TRIDENT

In 1980, the British Ministry of Defense announced the following judgment about nuclear weapons: "They cannot be disinvented; the only realistic course now available is to harness their existence to the service of peace in freedom, as NATO has done successfully for over thirty years."¹⁷⁰ The United Kingdom sought to acquire more advanced nuclear weapons for the purpose of deterring Soviet coercion or aggression. Following the Nassau Agreement of 1962 and the signing of the Polaris Sales Agreement on April 6, 1963, the United Kingdom began the process to design and construct a new generation of submarines that would carry U.S-built Polaris missiles and support systems.¹⁷¹ On January 3, 1963, Prime Minister Macmillan said "that unlike Skybolt, 'Polaris would extend the effectiveness and credibility of the United Kingdom deterrent for an almost indefinite period.'"¹⁷² The Labor Party argued in its General Election Manifesto in 1964 that Polaris "will not be independent and it will not be British and it will not deter."¹⁷³ Despite Labour Party member criticisms, the first Polaris submarine, named the *HMS Resolution*, was commissioned in 1967.¹⁷⁴

Since British nuclear strategy had been developed around bombers, the United Kingdom was forced to construct a new nuclear strategy based on its newly acquired technology. Polaris submarines offered forward-deployed capability, invulnerability to preemptive attack, greater range, and less risk for military personnel during employment, compared to the V-bombers.

¹⁷⁰ Great Britain, Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 2, par. 2.

¹⁷¹ Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007), 12.

¹⁷² Macmillan quoted in Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007).

¹⁷³ "Labour Party General Election Manifesto" quoted in Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007).

¹⁷⁴ *Ibid.*, 13.

Britain resolved that in order to maintain nuclear deterrence, at least one Polaris submarine would have to be deployed and available at all times. The British called this element of their deterrence strategy Continuous At Sea Deterrence: "Since 1969 there has never been a moment when our Polaris force did not have at least one submarine on patrol."¹⁷⁵ The maintenance and training cycles of the other three submarines and their crews were staggered in order for a relief submarine to be available at all times if the deployed submarine encountered trouble. The British government justified such a high level of readiness for its nuclear submarines by saying that the United Kingdom did not have a nuclear triad like the United States and that an effective attack on the nuclear submarine force could wipe out the United Kingdom's nuclear capabilities altogether.¹⁷⁶ In addition, if such an attack were successful, the repercussions of a war with the Soviet Union would be grim.

According to Lawrence Freedman,

The sea-based deterrent was considered to be a model second-strike force—invulnerable to a first strike, while so incapable of attacking anything other than cities that it could not threaten a first strike itself. In terms of stability this was exemplary. When it came to surprise attacks, submarines neither threatened first strikes nor were they threatened by one.¹⁷⁷

British strategists believed that at least one submarine needed to be invulnerable to preemptive attack to maintain a credible deterrent and that deployed submarines were invulnerable; therefore, one submarine needed to be deployed at all times. The Polaris submarines' technological merits and limitations supported the main objective of British nuclear strategy—to maintain credible nuclear deterrence protection for Britain through the threat of nuclear retaliation. Credible nuclear deterrence could only be achieved by maintaining an

¹⁷⁵ Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 6, par. 13.

¹⁷⁶ *Ibid.*, 8, par. 18.

¹⁷⁷ Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave Macmillan, 2003), 335.

independent nuclear deterrent capability. The British government maintained its position that extended deterrence by the United States might not ensure NATO's security because the Soviet assessment might hold that the use of U.S. nuclear weapons for the protection of NATO (or Britain in particular) would be too dangerous for the United States to accept. In the words of an official U.K. policy document in 1980,

The Government has great confidence in the depth of resolve underlying the United States commitment. But deterrence is a matter of perception, and perception by a potential adversary. The central consideration is what that adversary might believe, not what we or our Allies believe; our deterrence has to influence possible calculations made by leaders whose attitudes and values may differ sharply from those of the West. The decision to use United States nuclear weapons in defence of Europe, with all the risk to the United States homeland this would entail, would be enormously grave. A Soviet leadership—perhaps much changed in character from today's, perhaps also operating amid the pressures of turbulent internal or external circumstances—might believe that it could impose its will on Europe by military force without becoming involved in strategic nuclear war with the United States. Modernised US nuclear forces in Europe help guard against any such misconception; but an independent capability fully under European control provides a key element of insurance.¹⁷⁸

In addition, Prime Minister Macmillan agreed to commit British nuclear deterrent resources to the extended deterrence protection of NATO members. This was believed to be an important aspect of British nuclear strategy because it solidified the United Kingdom's nuclear commitment to its NATO Allies, strengthened its relationship with the United States in NATO, and provided supplementary justification for its possession of nuclear weapons. Although the

¹⁷⁸ Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 3, par. 5.

Polaris submarines were committed to the defense of NATO, Britain retained the right to utilize its nuclear forces “where H.M.G. may decide that supreme national interests are at stake.”¹⁷⁹

The expected service life of the Polaris submarines was to expire in the 1990s.¹⁸⁰ This forced Britain to build new submarines, adopt an alternative delivery platform, or consider nuclear disarmament. In 1995 Richard Ware wrote that, “Apart from the warheads, which were changed to the Chevaline type during the 1970s, the whole system dates from the 1960s and is now approaching obsolescence.”¹⁸¹ In 1979, Prime Minister Margaret Thatcher ordered a committee, MISC 7, to examine possible replacement options for Polaris.¹⁸² In 1980, the Ministry of Defense published *The Future United Kingdom Strategic Nuclear Deterrent Force*, which announced the government’s decision to replace its Polaris submarine fleet with a new fleet of nuclear ballistic missile submarines.¹⁸³

In 1980, the British government endorsed the building of a new generation of nuclear-weapons-equipped submarines, the Vanguard class. This new class of submarines was designed to carry the next generation of U.S. submarine-launched ballistic missiles—the Trident missile. In July 1980, President Carter agreed to sell the United Kingdom the Trident C4 missile. According to Francis Pym, then the Secretary of State for Defense, the agreement to buy Trident was comparable to the Nassau Agreement of 1962:

¹⁷⁹ “Joint Statement Following Discussions With Prime Minister Macmillan—The Nassau Agreement, December 21, 1962,” statement on Nuclear Defense Systems, Par. 8, accessed March 12, 2014, http://www.jfklink.com/speeches/jfk/publicpapers/1962/jfk554_62.html.

¹⁸⁰ Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 7.

¹⁸¹ Richard Ware, *The United Kingdom and Nuclear Weapons Research Paper 95/101* (London: House of Commons Library, 1995), 6.

¹⁸² Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave Macmillan, 2003), 326.

¹⁸³ Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980).

The Polaris force as a whole is entirely owned by the United Kingdom, and final decisions on its operational use rest with Her Majesty's Government alone; but it is committed to NATO and targeted in accordance with Alliance policy and strategic concepts under plans made by the Supreme Allied Commander Europe (SACEUR), save where Britain's supreme national interests otherwise require. The new Trident force will be acquired, committed and operated on the same basis.¹⁸⁴

In 1981, shortly after agreeing to buy the C4 missile, British Prime Minister Thatcher and Parliament recognized the benefits of acquiring the newer, more advanced Trident D5 missile instead.¹⁸⁵ President Reagan accelerated the procurement schedule of the Trident II (D5) program in October 1981.¹⁸⁶ Not only was Britain's decision to adopt the Trident D5 missile based on obtaining the upgraded capability compared to the C4, but also to facilitate "the retention of commonality with the United States Navy."¹⁸⁷ The United Kingdom desired to retain commonality with the United States in order to maintain its close nuclear relationship with Washington as well as to save time and money. Development of a comparable nuclear weapons delivery system would be more costly for the United Kingdom than to purchase SLBMs from the United States. According to the March 1982 Open Government document,

The costs and technical risks associated with such programmes to the United Kingdom, acting alone, are impossible to quantify so far ahead, but would be high by any standards. Again our experience with the *Chevaline* system shows just how expensive the resolution of problems in this field by programmes unique to the United Kingdom can be. If the United Kingdom were to adopt the *Trident D5* rather than the *Trident C4* missile for its next generation

¹⁸⁴ Francis Pym, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 1 [cover letter].

¹⁸⁵ Peter Hennessy, *Cabinets and the Bomb* (Oxford: Oxford University Press, 2007), 17.

¹⁸⁶ John Roper, "The British Nuclear Deterrent and New Developments in Ballistic-Missile Defence," *The World Today* 41, no. 5 (1985): 93. <http://www.jstor.org/stable/40395732>.

¹⁸⁷ The United Kingdom Trident Programme, Defense Open Government Document 82/1 (London: Ministry of Defence, 1982), par. 31 quoted in John Roper, "The British Nuclear Deterrent and New Developments in Ballistic-Missile Defence," *The World Today* 41, no. 5 (1985), <http://www.jstor.org/stable/40395732>.

SSBNs, we would expect to retain commonality with the United States system throughout its projected service life.¹⁸⁸

The Trident D5 missile presented greater capability than its predecessor, Polaris. Trident D5 missiles were able to carry 14 warheads¹⁸⁹ and to engage multiple targets simultaneously, thanks to what the United States called MIRV (multiple independently targetable reentry vehicles). Moreover, Trident D5 missiles could engage targets up to 6,000 nautical miles away.¹⁹⁰ According to Lawrence Freedman, the Polaris missile beginning in the 1960s carried “the Polaris A-3 warhead, which split up in a shotgun effect into three re-entry vehicles... but each separate warhead was unguided. However, it was accepted that mobility and multiple warheads came at the expense of accuracy.”¹⁹¹ MIRV missiles were estimated to remain effective and relevant despite technological improvements in the Soviet anti-ballistic missile systems.¹⁹²

Critics of the Trident II (D5) missiles argued that, despite Britain’s efforts to highlight the independence of its nuclear deterrent, its relationship with the United States and reliance on U.S.-made missiles conveyed a picture of dependence. Kevin Harrison argued that it solidified “Britain’s continuing dependence on American weapons systems, designed to meet American strategic needs.”¹⁹³ In addition, Kevin Harrison argued that the costs associated with continuing the nuclear deterrent left “Britain with the worst of all possible

¹⁸⁸ Ibid.

¹⁸⁹ Lawrence Freedman, “British Nuclear Targeting,” *Defense Analysis* 1, no. 2 (1985):94.

¹⁹⁰ Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 20, par. 51.

¹⁹¹ Lawrence Freedman, *The Evolution of Nuclear Strategy*, 3rd ed. (New York: Palgrave Macmillan, 2003), 335.

¹⁹² Great Britain Ministry of Defence, *The Future United Kingdom Strategic Nuclear Deterrent Force* (London: Ministry of Defense, 1980), 20.

¹⁹³ Kevin Harrison, “From Independence to Dependence: Blue Streak, Skybolt, Nassau, and Polaris,” *The RUSI Journal* 127, no. 4 (2008): 31.

worlds: an irrelevant, barely minimal nuclear deterrent and crumbling conventional forces lowering the nuclear threshold, making the use of the deterrent more likely.”¹⁹⁴

The British believed that building the submarines and warheads themselves conveyed a sense of independence in the acquisition of the nuclear platform and reinforced the domestic nuclear maritime infrastructure. The transition to Trident included the same allocation of effort and responsibility as with the Polaris submarines—the United Kingdom built the Trident submarines and the nuclear warheads, while the United States supplied the missiles. In addition, command and control over the British nuclear submarines and their armaments remained solely in the hands of the British government.

Although the British nuclear strategy of CASD did not change with the commissioning of a fleet of four Trident submarines, the targeting and employment strategy of the Trident missiles required revision due to the technological advancements. In the post-Cold War context of weapons of mass destruction (WMD) proliferation to regional powers, the British government identified limited employment options against such powers. For example, in March 2002, Geoff Hoon, then Secretary of State for Defence, said:

They can be absolutely confident that in the right conditions we would be willing to use our nuclear weapons. What I cannot be absolutely confident about is whether that would be sufficient to deter them from using a weapon of mass destruction in the first place.¹⁹⁵

Bomber aircraft remained in service alongside SLBMs until 1998, when all WE177 gravity bomb warheads were decommissioned.¹⁹⁶ Once the bombers were removed from service, the entirety of the nuclear deterrent was placed on

¹⁹⁴ Ibid.

¹⁹⁵ Geoff Hoon, House of Commons, Select Committee on Defence, examination of witnesses, questions 236 and 237, March 20, 2002, www.parliament.the-stationery-office.co.uk/pa/cm200102/cmselect/cmdfence/644/2032008.htm.

¹⁹⁶ David S. Yost, “New Approaches to Deterrence in Britain, France, and the United States,” *International Affairs* 81, no.1 (2005): 1.

Britain's four Trident submarines—both the strategic and sub-strategic missions.¹⁹⁷ For the first time in Britain's history, the RAF no longer played a nuclear deterrent role.¹⁹⁸ Des Browne, then the Secretary of State for Defence, announced in 2002 that the British government would no longer use the term "sub-strategic":

The UK has in fact never sought to use our nuclear weapons as a means of provoking or coercing others. We will never do so. Nor are our weapons intended or designed for military use during conflict. Indeed, we have deliberately chosen to stop using the term 'sub-strategic Trident', applied previously to a possible limited use of our weapons. I would like to take this opportunity to reaffirm that the UK would only consider using nuclear weapons in the most extreme situations of self-defence.¹⁹⁹

According to the "Statement on the Defence Estimates 1995,"

We announced last year that we would not develop a new air-launched nuclear system to replace the WE177 bomb but instead would rely on the flexibility of the Trident system to fulfill the sub-strategic as well as the strategic nuclear deterrent role in the longer term. The corollary is that we do not expect to develop a new nuclear weapon system any earlier than would be required to replace Trident.²⁰⁰

The technological advances of Trident enabled it to assume complete responsibility for all of Britain's nuclear weapons needs, and it continues to do so today. Despite the ever changing global security environment, the United Kingdom has continued to retain its nuclear deterrent capability through the fleet

¹⁹⁷ Richard Ware, *The United Kingdom and Nuclear Weapons Research Paper 95/101* (London: House of Commons Library, 1995), 7.

¹⁹⁸ Ibid.

¹⁹⁹ Des Browne, "The United Kingdom's Nuclear Deterrent in the 21st Century," at Kings College London, January 25, 2007, <http://www.mod.uk/defenceinternet/aboutdefence/people/speeches/sofs/20070125theunitedkingdomsnucleardeterrentinthe21stcentury.htm>.

²⁰⁰ "Statement on the Defence Estimates 1995," quoted in Richard Ware, *The United Kingdom and Nuclear Weapons Research Paper 95/101* (London: House of Commons Library, 1995), 13.

of four submarines as an insurance policy for an uncertain future.²⁰¹ Britain is again faced with the decision for the future of its nuclear deterrent. London has made preliminary decisions to replace its obsolescent Trident fleet with a new fleet of Trident submarines; the final decision is scheduled for 2016.²⁰²

²⁰¹ Great Britain Ministry of Defence, *The Future of the United Kingdom's Nuclear Deterrent* (London: Stationery Office, 2006), 5.

²⁰² Great Britain Ministry of Defence, *The United Kingdom's Future Nuclear Deterrent: The Submarine Initial Gate Parliamentary Report* (London: Stationery Office, 2011), 2.

THIS PAGE INTENTIONALLY LEFT BLANK

V. INSURANCE: BRITAIN'S RATIONALE FOR NUCLEAR DETERRENCE IN THE TWENTY-FIRST CENTURY

Prime Minister David Cameron stated in a speech commemorating the 100th patrol of Britain's Trident-missile-equipped submarines, "Every hour of every day, one of these submarines is patrolling the oceans—silent and invisible, armed and alert, our ultimate insurance against nuclear attack."²⁰³ His words emphasize Britain's justification for the post-Cold War retention of its nuclear weapons: insurance. According to Cameron, "It is an insurance policy that the United Kingdom cannot do without."²⁰⁴

The Soviet nuclear threat during the Cold War justified paying the high price of nuclear deterrence. It has proven more difficult to justify maintaining a nuclear deterrent without a specific nuclear threat. It is also challenging to ascertain whether Britain's nuclear deterrence capabilities have prevented an invasion or attack—simply put, it appears that deterrence works until it doesn't. Britain has consistently endorsed maintaining a continuous at-sea deterrence (CASD) policy instead of relying exclusively on U.S. extended deterrence or disarming.²⁰⁵ In Malcolm Chalmers's words,

The strategic case for the UK nuclear force as a hedge against uncertainty is not only about potential enemies. It is also rooted in a concern that, when the chips are down, the UK might find itself without friends at precisely the moment when it needed them most. That is why the central rationale for the UK's nuclear force has always been a national, rather than an alliance, one.²⁰⁶

²⁰³ David Cameron, "We Need a Nuclear Deterrent More than Ever" (presented at, Britain's 100th Vanguard Patrol, April 3, 2013), Par. 1, <http://www.telegraph.co.uk/news/politics/david-cameron/9969596/David-Cameron-We-need-a-nuclear-deterrent-more-than-ever.html>.

²⁰⁴ Ibid., par. 12.

²⁰⁵ Malcolm Chalmers, *Continuous at-Sea Deterrence: Costs and Alternatives* (London: Royal United Services Institute, 2010), 1.

²⁰⁶ Malcolm Chalmers, "Towards the UK's Nuclear Century," *The RUSI Journal* 158, no. 6 (2013): 25.

The evaluation of why Britain feels the need to retain nuclear weapons capability peels back the curtain on its assessment of future threats and of the utility of nuclear deterrence in countering potential threats.

The British government does not pretend to have all of the answers. Its policy to retain nuclear weapons capability reflects its recognition of the uncertainty that lies ahead.²⁰⁷ According to the *Strategic Defence and Security Review* in 2010, the British government acknowledges,

No state currently has both the intent and the capability to threaten the independence or integrity of the UK. But we cannot dismiss the possibility that a major direct nuclear threat to the UK might re-emerge—a state's intent in relation to the use or threat of use of its capabilities could change relatively quickly, and while we will continue to work internationally to enhance mutual trust and security, we cannot rule out a major shift in the international security situation which would put us under grave threat.²⁰⁸

Nuclear weapons are viewed as an insurance policy against potential aggressors who may wish to harm or coerce Britain with nuclear weapons.²⁰⁹ The British Parliament and Ministry of Defense have published a series of documents explaining the United Kingdom's nuclear policy, future strategic challenges, nuclear delivery platform alternatives, etc.

On July 16, 2013, the British government published the *Trident Alternatives Review*, which analyzed alternative nuclear delivery platforms. Although the government published the review, it is not considered government policy because the document was prepared at the request of the Liberal Democrats, one of the two parties in the governing coalition in Parliament.²¹⁰

²⁰⁷ Great Britain Ministry of Defence, *The Future of the United Kingdom's Nuclear Deterrent* (London: Stationery Office, 2006), 5.

²⁰⁸ Great Britain Cabinet Office, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review* (London: Stationery Office, 2010), 37, par 3.2.

²⁰⁹ Great Britain Ministry of Defence, *The Future of the United Kingdom's Nuclear Deterrent* (London: Stationery Office, 2006), 5.

²¹⁰ Malcolm Chalmers, "Towards the UK's Nuclear Century," *The RUSI Journal* 158, no. 6 (2013): 20.

The *Trident Alternatives Review* (TAR) sought to analyze whether other nuclear delivery platforms could be considered a credible deterrent and be more cost effective, whether the ballistic missile submarine deterrent should be modified (e.g., with cruise missiles), and whether a ballistic missile submarine deterrent force would be credible without the CASD strategy.²¹¹ The *Trident Alternatives Review* states, however, that it does not “offer recommendations” or advocate one platform or strategy above another.²¹²

Some of the “shortlist”²¹³ submarine alternatives that the *Trident Alternatives Review* discusses are aircraft, surface ships, submarines, and land-based missile silos.²¹⁴ Other alternatives were also considered but dismissed in favor of more credible or more feasible options.²¹⁵ Ballistic missiles, gravity bombs and many variations of cruise missiles were assessed as alternatives for the current SLBM delivery system.²¹⁶

The *Trident Alternatives Review* found that cruise missile alternative platforms, including aircraft options, would be less expensive throughout their service lives than a 3 or 4 boat fleet of Trident SSBNs. The time that would be required to develop and build the cruise missiles, however, would necessitate that a subsequent fleet of submarines be constructed to fill the gap between the ended service life of the previous generation of Trident submarines and the date the cruise missiles would be available for service. To not fill the gap would mean that the United Kingdom would be altogether without a nuclear deterrent and would have to rely on the protection of the United States and France. The costs required to do both—to build a new fleet of submarines and develop and procure cruise missiles—would put the budget over what would be required to build a

²¹¹ Great Britain Cabinet Office, *Trident Alternatives Review* (London: The Cabinet Office, 2013), 3, par. 3.

²¹² *Ibid.*, 3, par. 4.

²¹³ *Ibid.*, 20, par. 2.22.

²¹⁴ *Ibid.*, 16–19, par. 2.1-2.18.

²¹⁵ *Ibid.*, 16, par. 2.1.

²¹⁶ *Ibid.*, 17–19, par. 2.10-2.18.

subsequent generation of submarines alone. Therefore, the Review found that constructing a nuclear deterrent comparable to the current one would be the most credible and cost-effective option.²¹⁷

Some may ask why the Liberal Democrats requested an alternatives review report when alternative platforms had already been analyzed in the 2006 White Paper. The answer to this question resides in the differences in what each report considered adequate platform capabilities and a minimum deterrent. The TAR reduced the requirements of the platform to “A minimum nuclear deterrent capability that, during a crisis, is able to deliver at short notice a nuclear strike against a range of targets at an appropriate scale and with very high confidence.” In contrast, in the 2006 white paper’s assessment, according to Malcolm Chalmers, “all options were compared against a fixed, and ambitious, requirement (for example, in relation to continuous availability).”²¹⁸ The 2006 White Paper’s guideline for a minimum deterrent was based on the assumption that the deterrent would be continuously operating. The TAR only required, however, that the nuclear platform be available during a crisis.²¹⁹

Despite ambitious nuclear force modernization and evidence of nuclear proliferation risks in much of Eurasia,²²⁰ public support in Britain for the current policy of nuclear deterrence has been characterized as “lukewarm.”²²¹ Critics of Britain’s nuclear weapons program argue that nuclear weapons are no longer needed in the current security environment since the end of the Cold War.²²²

²¹⁷ Ibid., 45–46, par. 6.20.

²¹⁸ Malcolm Chalmers, “Towards the UK’s Nuclear Century,” *The RUSI Journal* 158, no. 6 (2013): 20.

²¹⁹ Ibid.

²²⁰ Ashley J. Tellis, “No Escape: Managing the Enduring Reality of Nuclear Weapons,” an overview of *Strategic Asia 2013–14: Asia in the Second Nuclear Age* (Seattle: The National Bureau of Asian Research, 2013).

²²¹ Malcolm Chalmers, “Towards the UK’s Nuclear Century,” *The RUSI Journal* 158, no. 6 (2013): 20.

²²² David Cameron, “We Need a Nuclear Deterrent More than Ever” (presented at, Britain’s 100th Vanguard Patrol, April 3, 2013), par. 3, <http://www.telegraph.co.uk/news/politics/david-cameron/9969596/David-Cameron-We-need-a-nuclear-deterrent-more-than-ever.html>.

Many believe that nuclear weapons are inhumane due to their immense destructive power and their capacity to cause the indiscriminate annihilation of combatants and noncombatants alike.

In addition, critics observe, it is unclear how nuclear weapons could be utilized to deter non-state actors, such as terrorists.²²³ The Nuclear Information Service, a nuclear disarmament advocacy group based in the United Kingdom, has asserted, “Nuclear weapons are irrelevant to terrorists. Nuclear weapons based in the UK are the easier target and pose a real risk of terrorist attack that should be eliminated if we are serious about the security of citizens in the UK.”²²⁴ It is precisely because nuclear weapons could be an attractive target of terrorist attacks that the United Kingdom and other responsible nuclear weapons states have invested so much in protecting them.

Although Britain retains its independent nuclear deterrent (independent meaning that Britain has full control and sole launching authority), Britain cannot ensure its security with its capabilities alone. The United Kingdom’s nuclear forces are most relevant as part of NATO’s architecture of deterrence capabilities. According to an expert British observer,

To be brutally honest, the UK rationale depends on the continuing NATO context of US extended deterrence. Operating independently, the UK nuclear force strengthens difficulties in the mind of a potential aggressor. It’s not really based on a scenario of Britain alone in the world. It’s a more subtle justification. What we have really makes sense because it’s set in this context of US extended deterrence. The United Kingdom would be very worried if US extended deterrence appeared to be weakening.²²⁵

²²³ This argument is a red herring, of course. The British government has not claimed that its nuclear deterrence posture is designed to counter non-state actors. It is intended to deter states, including state sponsors of terrorism, from engaging in coercion or aggression against the United Kingdom and its allies.

²²⁴ Nuclear Information Service, “The Future of Nuclear Weapons in the United Kingdom: A Response to the Government White Paper” (written evidence memorandum to the House of Commons Committee on Defense) March 7, 2007, question 3, <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/ucwhite/ucm9c02.htm>.

²²⁵ British observer in an off-the-record interview, quoted in David S. Yost, “Strategic Stability in Europe,” *The Nonproliferation Review* 20, no. 2 (2013), 232.

The United Kingdom's alliance with the United States and other NATO allies strengthens and complicates the deterrence equation in relation to potential adversaries. Malcolm Chalmers, however, argues that the United Kingdom cannot always depend on its alliances for security and that its nuclear force was constructed to act as an independent deterrent:

The sizing of the UK nuclear force is not driven by a requirement to provide a particular, or proportionate, contribution to joint US-UK capabilities. Moreover, while the UK places considerable weight on the importance of maintaining the US alliance, it does not assume that the US's nuclear force would always be available (and seen to be available) for defence of its vital interests.²²⁶

Nuclear deterrence insurance is not Britain's only motivation to retain nuclear weapons, but it is its principal objective. The British government holds that Britain's requirement for nuclear weapons is derived from its need for security in an uncertain future. Possible future threats that are highlighted in the 2006 White Paper include proliferation (the spread of nuclear weapons to new states), state-sponsored terrorism, and the threat of chemical and biological weapons use by state and non-state actors.²²⁷ The British also justify their nuclear program through their commitment to the security of their NATO allies, their need to support domestic technical industries, and their collaborative partnership with the United States.²²⁸ The British government does not publicly emphasize possible ancillary motives such as maintaining nuclear prestige and global status, sustaining political influence, and obtaining benefits from the special relationship with the United States in nuclear and other matters. A Royal United Services Institute (RUSI) report stated, "Indeed, it would be impossible for

²²⁶ Malcolm Chalmers, "Towards the UK's Nuclear Century," *The RUSI Journal* 158, no. 6 (2013): 23.

²²⁷ Great Britain Ministry of Defence, *The Future of the United Kingdom's Nuclear Deterrent* (London: Stationery Office, 2006), 18–19.

²²⁸ *Ibid.*, 18.

a British government to argue in a public document that international status and influence were factors in maintaining and sustaining nuclear deterrent capability.”²²⁹

Lee Willett, Head of the Maritime Studies Programme at RUSI, argued in his verbal testimony to the House of Commons on January 23, 2007, that the acquisition of nuclear weapons ensured that Britain would be a first-class global power despite the financial and political turmoil following World War II.²³⁰ Nuclear weapons continue to be a symbol of status as well as instruments of security.

Although the government’s nuclear deterrence policy has not significantly changed since the end of the Cold War, it has downsized its nuclear arsenal and decreased submarine payloads in response to the changed environment since the end of the Cold War. The government in 2010 announced plans to further decrease its nuclear capability to the minimum deterrent necessary. The decisions included restricting the number of warheads onboard submarines from 48 to 40, reducing the number of SLBMs onboard submarines, decreasing Britain’s operationally available warhead stockpile from “fewer than 160 to no more than 120,” and keeping its overall nuclear weapon stockpile to “no more than 180” warheads.²³¹

British deterrence policy has been intentionally ambiguous to keep potential adversaries uncertain as to how, when, and to what extent Britain would utilize nuclear weapons. Ambiguity can act to strengthen the deterrent. According to the International Security Information Service (ISIS), an independent research organization based in Brussels,

²²⁹ Michael Codner, Gavin Ireland, and Lee Willett, *The United Kingdom’s Independent Strategic Nuclear Deterrent: Observations on the 2006 White Paper and Issues for the Parliamentary Debate*, Whitehall Report 1-07 (London: Royal Services Institute, 2007), 12.

²³⁰ Lee Willett, Oral Evidence taken before the British House of Commons Defence Committee on January 23, 2007, *The Future of the UK’s Strategic Nuclear Deterrent: the White Paper: Ninth Report of Session 2006-07, Volume II Oral and Written Evidence* (London: The Stationery Office, 2007), 41.

²³¹ Great Britain Cabinet Office, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review* (London: Stationery Office, 2010), 38, par. 3.10.

A degree of uncertainty or ambiguity about whether or not Britain might retaliate with nuclear weapons is deemed to strengthen deterrence. The logic ...[is] that if the adversary knew precisely the circumstances in which Britain would use its nuclear weapons it could take action up to that point.²³²

Uncertainty regarding how, when, and to what extent the government would utilize nuclear weapons is a significant factor in deterrence and therefore in justifying the retention of nuclear weapons in the post-Cold War world.

To disarm (that is, to abandon the national nuclear weapons posture) would also mean to cut the United Kingdom's nuclear special relationship ties with the United States—a relationship from which the United Kingdom reaps many benefits. Britain may believe that the costs of sustaining its nuclear deterrent are worth the price if it receives intelligence, technology, and resources from the United States government that it might not have access to if it were not a nuclear-armed ally. Britain was the third country to become a nuclear power, and it is one of the two countries in the European Union (EU) that have national nuclear weapons programs. The British government may dislike the idea of disarming and allowing France to be the only nuclear power in the EU.²³³ It is important to add that “Deterrence and nuclear deterrence in particular have been among the topics implicitly excluded from the European Union's European Security and Defence Policy.”²³⁴ Discussions of nuclear deterrence have, instead, been conducted within NATO. Britain maintains its commitment to NATO's defense as one of its security priorities:

Our obligations to our NATO Allies will continue to be among our highest priorities and we will continue to contribute to NATO's

²³² International Security Information Service, *Memorandum from the International Security Information Service (ISIS)* (written evidence memorandum to the House of Commons Committee on Defense), December 18, 2006, par. A-6, <http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/225/225we09.htm>.

²³³ Michael Codner, Gavin Ireland, and Lee Willett, *The United Kingdom's Independent Strategic Nuclear Deterrent: Observations on the 2006 White Paper and Issues for the Parliamentary Debate*, Whitehall Report 1-07 (London: RUSI, 2007), 12.

²³⁴ David S. Yost, “New Approaches to Deterrence in Britain, France, and the United States,” *International Affairs* 81, no. 1(2005), 114.

operations and its Command and Force Structures, to ensure that the Alliance is able to deliver a robust and credible response to existing and new security challenges.²³⁵

To give up the status of a nuclear power would mean giving up influence in NATO, Europe, and the United States.

In 1980, the British government was faced with the same decision that Parliament has faced in recent years: should Britain renew its nuclear delivery platforms or should it disarm? In 1980 and 2006, the government chose to retain its nuclear weapons capability. On both occasions, alternative nuclear weapons delivery platforms were evaluated as potential successor systems to the submarine fleet. In both cases, Britain decided that a fleet of four ballistic missile submarines would constitute the most effective solution. They are invulnerable to preemptive attack while on deployment and are able to launch nuclear-armed ballistic missiles of extensive range. The four-boat policy is believed to ensure the highest level of readiness, in accordance with the CASD strategy.

Prime Minister David Cameron has affirmed that the British independent nuclear deterrent is vital now and for the future security of the United Kingdom. Cameron stated, “My judgment is that it would be foolish to leave Britain defenceless against a continuing, and growing, nuclear threat.”²³⁶ The Final Gate decision is scheduled for 2016, when Parliament could vote to finalize plans for construction of the next generation of Trident submarines.²³⁷ If the Final Gate legislation passes, the first of the new fleet of submarines is estimated to enter service in 2024.²³⁸

²³⁵ Great Britain Cabinet Office, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review* (London: Stationery Office, 2010), par. 5.11.

²³⁶ David Cameron, “We Need a Nuclear Deterrent More than Ever” (presented at, Britain’s 100th Vanguard Patrol, April 3, 2013), par. 7, <http://www.telegraph.co.uk/news/politics/david-cameron/9969596/David-Cameron-We-need-a-nuclear-deterrent-more-than-ever.html>.

²³⁷ Great Britain Ministry of Defence, *The United Kingdom’s Future Nuclear Deterrent: The Submarine Initial Gate Parliamentary Report* (London: The Stationery Office, 2011), 4.

²³⁸ Ibid.

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Ball, S. J., *The Bomber in British Strategy: Doctrine, Strategy, and Britain's World Role, 1945–1960*. Boulder, Colorado: Westview Press, 1995.
- Baylis, John and Alan Macmillan, "The British Global Strategy Paper of 1952." *Journal of Strategic Studies* 16, no. 2 (1993): 425–466. Doi: 10.1080/01402390802024726.
- Baylis, John. "The 1958 Anglo-American Mutual Defence Agreement: The Search for Nuclear Interdependence." *Journal of Strategic Studies* 31, no. 3 (2008): 200-226. Doi: 10.1080/01402390802024726.
- Browne, Des. "The United Kingdom's Nuclear Deterrent in the 21st Century." Presented at Kings College London. January 25, 2007.
<http://www.mod.uk/defenceinternet/aboutdefence/people/speeches/sofs/20070125theunitedkingdomsnucleardeterrentinthe21stcentury.htm>.
- Cameron, David. "We Need a Nuclear Deterrent More than Ever." Presented at Britain's 100th Vanguard Patrol, London, April 3, 2013.
<http://www.telegraph.co.uk/news/politics/david-cameron/9969596/David-Cameron-We-need-a-nuclear-deterrent-more-than-ever.html>.
- Chalmers, Malcolm. *Continuous At-Sea Deterrence: Costs and Alternatives*. Royal United Services Institute. 2010.
<https://www.rusi.org/downloads/assets/CASD.pdf>.
- Chalmers, Malcolm. "Towards the UK's Nuclear Century," *The RUSI Journal* 158, no. 6 (2013). Doi: 10.1080/03071847.2013.869720.
- Clark, Ian. *Nuclear Diplomacy and the Special Relationship: Britain's Deterrent and America, 1957–1962*. Oxford: Clarendon Press, 1994.
- Clark, Ian and Nicholas J. Wheeler. *The British Origins of Nuclear Strategy, 1945–1955*. Oxford: Clarendon Press, 1989.
- Cocroft, Wayne D. *A Brief Assessment of the Role of Fort Halstead*. Research Department Report Series no. 49 (2010): 1-49. http://services.english-heritage.org.uk/.../049_2010WEB.pdf

- Codner, Michael, Gavin Ireland, and Lee Willett. *The United Kingdom's Independent Strategic Nuclear Deterrent: Observations on the 2006 White Paper and Issues for the Parliamentary Debate*. Whitehall Report 1-07. London: Royal Services Institute. 2007.
https://www.rusi.org/downloads/assets/RUSI_Trident_Whitehall_Report.pdf.
- Freedman, Lawrence. "British Nuclear Targeting." *Defense Analysis* 1, no. 2 (1985): 81–99. Doi: 10.1080/07430178508405190.
- Freedman, Lawrence. *The Evolution of Nuclear Strategy*. 3rd ed. New York: Palgrave Macmillan, 2003.
- Gott, Richard. "The Evolution of the Independent British Deterrent." *International Affairs* 39, no. 2 (1963): 238–252. <http://www.jstor.org/stable/2611300>.
- Gowing, Margaret. *Independence and Deterrence: Britain and Atomic Energy, 1945–1972*. Vol. 1. New York: St. Martin's Press, 1974.
- Great Britain Cabinet Office. *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*. London: Stationery Office, 2010.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/62482/strategic-defence-security-review.pdf.
- Great Britain Cabinet Office. *Trident Alternatives Review*. London: The Cabinet Office, 2013.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/212745/20130716_Trident_Alternatives_Study.pdf.
- Great Britain Ministry of Defence. *The Future of the United Kingdom's Nuclear Deterrent*. London: Stationery Office, 2006.
- . *The United Kingdom's Future Nuclear Deterrent: 2012 Update to Parliament*. London: Ministry of Defense, 2012.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/39252/191212a_uk_future_nuc_deter2012_update.pdf.
- . *The United Kingdom's Future Nuclear Deterrent: The Submarine: Initial Gate Parliamentary Report*. London: Ministry of Defense, 2011.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/27399/submarine_initial_gate.pdf.
- Groom, A. J. R. "The British Deterrent" in *British Defence Policy in a Changing World*, edited by John Baylis. London: Croom Helm, 1977.
- Groom, A. J. R. *British Thinking about Nuclear Weapons*. London: F. Pinter, 1974.

- Groom, A. J. R. "U.S.-Allied Relations and the Atomic Bomb in the Second World War." *World Politics* 15, no. 1 (1962): 123–137.
<http://www.jstor.org/stable/2009571>.
- Harrison, Kevin. "From Independence to Dependence. Blue Streak, Skybolt, Nassau, and Polaris." *RUSI Journal* 127, no. 4 (1982): 25–31. Doi: 10.1080/03071848208523423.
- Hennessey, Peter. *Cabinets and the Bomb*. Oxford: Oxford University Press, 2007.
- Holloway, David. *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939–1956*. New Haven: Yale University Press, 1994.
- Hufbauer, Karl. "The Nuclear Age: Britain's Role." *Science* 214, no. 4518 (1981): 324. <http://jstor.org/stable/1686877>.
- Massey, Harrie. "Atomic Energy and the Development of Large Teams and Organizations." Proceedings of the Royal Society of London: *Series A, Mathematical and Physical Sciences* 342, no. 1631 (1975): 491–497.
<http://www.jstor.org/stable/78748>.
- Navias, Martin S. "Strengthening the Deterrent? The British Medium Bomber Force Debate, 1955–56." *Journal of Strategic Studies* 11, no. 2 (1988): 203–219. Doi: 10.1080/01402398808437338.
- Nuclear Information Service. "The Future of Nuclear Weapons in the United Kingdom: A Response to the Government White Paper." Written evidence memorandum to the House of Commons Committee on Defense. March 7, 2007.
<http://www.publications.parliament.uk/pa/cm200607/cmselect/cmdfence/ucwhite/ucm9c02.htm>.
- Pierre, Andrew J. *Nuclear Politics: The British Experience with an Independent Strategic Force, 1939–1970*. London: Oxford University Press, 1972.
- Roper, John. "The British Nuclear Deterrent and New Developments in Ballistic-Missile Defence." *The World Today* 41, no. 5 (1985): 92–95.
<http://www.jstor.org/stable/40395732>.
- Rosecrance, Richard N. *Defense of the Realm: British Strategy in the Nuclear Epoch*. New York: Columbia University Press, 1968.
- Szasz, Ferenc Morton. *The Day the Sun Rose Twice: The Story of the Trinity Site Nuclear Explosion, July 16, 1945*. Albuquerque, NM: University of New Mexico Press, 1984.

- Tellis, Ashley J. *"No Escape: Managing the Enduring Reality of Nuclear Weapons," an overview of Strategic Asia 2013–14: Asia in the Second Nuclear Age.* The National Bureau of Asian Research. 2013.
http://www.nbr.org/publications/strategic_asia/pdf/SA13_Tellis.pdf.
- Twigge, Stephen and Len Scott. *Planning Armageddon: Britain, the United States, and the Command of Western Nuclear Forces, 1945–1964.* Amsterdam: Harwood Academic Publishers, 2000.
- Ware, Richard. *The United Kingdom and Nuclear Weapons.* Research Paper 95/101. London: House of Commons Library, 1995.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California